A COMPARATIVE STUDY OF *FINE NEEDLE ASPIRATION CYTOLOGY VERSUS FINE NEEDLE NON ASPIRATION CYTOLOGY VERSUS ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY* IN THE CYTOLOGICAL EVALUATION OF THYROID LESIONS

DISSERTATION SUBMITTED TO

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

in partial fulfillment of the regulations for the award of the degree of

M.S. (GENERAL SURGERY)BRANCH –I

STANLEY MEDICAL COLLEGE & HOSPITAL

CHENNAI

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI,TAMIL NADU

APRIL 2016

CERTIFICATE

This is to certify that the Dissertation entitled***"A COMPARATIVE STUDY OF FINE NEEDLE ASPIRATION CYTOLOGY VERSUS FINE NEEDLE NON ASPIRATION CYTOLOGY VERSUS ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN THE CYTOLOGICAL EVALUATION OF THYROID LESIONS"*** is the bonafide original work of **Dr. SAKTHI BALAN. M**, Post graduate student(2013 – 2016)in the Department of General Surgery under my direct guidance and supervision, in partial fulfilment of the regulations of The Tamil Nadu Dr.M.G.R. Medical University, Chennai for the award of M.S., Degree (General Surgery) Branch-I, Examination of to be held in APRIL 2016.

Prof.Dr.D.NAGARAJAN,M.S.,
Professor of Surgery,
Department of General Surgery,
Stanley Medical College,
Chennai_600001.

Prof.Dr.S.VISWANATHAN,M.S.,
Professor and Head of the Department,
Department of General Surgery,
Stanley Medical College,
Chennai_600001.

Prof.Dr.ISSAC CHRISTIAN MOSES,M.D.,
The Dean
Stanley Medical College,
Chennai_600001.

DECLARATION

I , **Dr. SAKTHI BALAN M**,solemnly declare that this dissertation titled"***A COMPARATIVE STUDY OF FINE NEEDLE ASPIRATION CYTOLOGY VERSUS FINE NEEDLE NON ASPIRATION CYTOLOGY VERSUS ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN THE CYTOLOGICAL EVALUATION OF THYROID LESIONS***"is a bonafide work done by me in the Department of General Surgery, Stanley Medical College Hospital, Chennai under the guidance and supervision of my unit chief, **PROF.DR. D.NAGARAJAN,M.S,** Professor of Surgery.

This dissertation is submitted to The TamilnaduDr.M.G.R.Medical University towards the partial fulfillment ofrequirements for the award of M.S. Degree (Branch I) in General Surgery.

Place: Chennai.
September 2015.

Dr.SAKTHI BALAN M,
Postgraduate Student,
M.S General Surgery,
Department of Surgery,
Stanley Medical College,
Chennai.

ACKNOWLEDGEMENT

I take immense pleasure to acknowledge all those who have helped me to make this dissertation possible.

I am grateful to **Dr.ISSAC CHRISTIAN MOSES,M.D.,** The Dean, Stanley Medical College and Hospital for permitting me to undertake this study and for allowing me to avail the facilities needed for my dissertation work. I also thank the former Dean of Stanley Medical College, **Dr. MEENAKSHISUNDARAM,M.D.,D.A.,** under whom the Institutional Ethical Committee approved my dissertation.

I express my profound sense of gratitude to **Prof.Dr.S.VISWANATHAN.M.S.,** my respected teacher, Professor and Head of the Department of Surgery, Stanley Medical College, Chennai, for approving this study and for her guidance in preparing this dissertation.

I am extremely grateful and indebted to my guide, mentor and unit chief **Prof.Dr.D.NAGARAJAN.M.S.,** for his guidance and constant encouragement throughout this study.

I express my deepest sense of thankfulness to my assistant professors **Dr.S.JIM JEBAKUMAR and Dr. MALARVIZHI** for their valuable guidance and constant encouragement.

I express my sincere gratitude to my guides **Prof.Dr.P.DARWIN, Prof.Dr.J.VIJAYAN AND Prof.Dr.K.KAMARAJ** ,former Heads of Department of General Surgery and my former Professor, **Prof.Dr.A.RAJENDRAN** for the constant support,able guidance ,inspiring words and the valuable help they rendere to me during my course.

I would like to thank my former Assistant Professor and current Surgical Registrar **Dr.G.VENKATESH** for his valuable suggestions and help in completing this dissertation.

I am particularly thankful to my colleagues and friends Dr.Prasanna, Dr.Arvind Menon, Dr.Vinoth, Dr.Sukhdev, Dr.Madhuri ,Dr.Mathew , Dr.Sreekanth and Dr.Ben without whom accomplishing this task would have been impossible. I thank my seniors Dr.Gautham Krishnamurthy, Dr.N.Sangaranarayanan, Dr.Soundarya G, Dr.Arshad Ali, Dr.Dinesh and Dr.Kaushik Kumar for their valuable support in this study.

Finally, I wish to thank all my patients without whom this study would not have been possible.

ABBREVIATIONS

FNAC - Fine needle aspiration cytology

FNNAC - Fine needle non-aspiration cytology

T3 – Triiodothyronine

T4 - Thyroxine

TSH - Thyroid stimulating hormone

TRH - Thyrotropin releasing hormone

SNT - Solitary nodule of thyroid

MNG – Multinodular goitre

CNG - Colloid nodular goitre

CG - Colloid goitre

Pap Ca - Papillary carcinoma

CONTENTS

INTRODUCTION

The Thyroid gland is unique among the endocrine glands because of its larger size and superficial location ,which makes it easily accessible for direct physical, cytological and histopathological examination.

In clinical practice,diseases of the thyroid gland due to developmental, inflammatory, infectious, hyperplastic, degenerative and neoplastic pathologies are prevalent. Thyroid lesions may present in the form of diffuse enlargement or solitary nodules or multiple nodules.

Among the various thyroid nodular lesions, incidence of malignancy is relatively low . Hence diagnostic modalities that have better ability to differentiate benign from malignant lesions and differentiate between non neoplastic and neoplastic lesions are of prime importance ,based on which further treatment can be decided .

For more than a century, the surgeon has been dependant on the histopathologist for providing a definitive diagnosis and deciding further therapy. As the procedure was complex and the cost factor was high, it lead to the utilisation of exfoliated cells to serve as a screening and predictive tool. Later pioneer cytologists started employing needles into tissues to obtain rapid diagnosis. Due to the ever increasing demand for a minimally invasive, relatively painless, cheap and rapid diagnostic

modality,fine needle aspiration cytology began to flourish and grow enormously. Its clinical value is not only limited to neoplastic conditions but also in establishing the diagnosis of inflammatory, infectious and degenerative conditions for which samples can be used for biological and biochemical analysis.Thus, Fine needle aspiration cytology of the thyroid became established as the first line diagnostic test for the evaluation of various thyroid disorders.

In clinical practice, FNAC is mainly used in differentiating malignant thyroid nodules from benign nodules as the later can be followed up clinically. Fine needle aspiration cytology involves the aspiration of cellular material from the target masses by using high suction pressure with the help of needle and syringe. However, FNA has a disadvantage of inadequate and bloody samples as thyroid is a highly vascular organ. A modified sampling technique called fine needle non-aspiration cytology (FNNAC) , pioneered in France by Brifford et al in the 1980s has come into clinical use in recent times.In FNNAC , active aspiration by syringe is replaced by the principle of capillary suction of fluid or semi fluid material into a thin channel (fine needle)thereby overcoming the problems of inadequate and bloody samples . Relative to FNAC ,FNNAC is technically less painful, less traumatic and patient-friendly and the smears obtained by FNNAC are of “text book” quality. Studies

in the past involving FNAC and FNNAC have been done mainly by pathologists. However, in resource limited settings of rural India with the non availability of pathologist, the role of surgeon becomes important. Hence,we tried to compare the efficacy of FNAC with FNNAC during the evaluation of thyroid lesions , sampling being performed by single surgeon.

Whereas superficial lesions of thyroid are readily accessible with blind FNAC technique,deeply seated lesionsare relatively difficult to be sampled adequately for accurate diagnosis for which imaging techniques like ultrasound comes into play.Hence in our tertiary care centre set up, we tried to analyse the efficacy of USG guided FNAC.

AIM OF THE STUDY

1. To evaluate the efficacy of fine-needle non-aspiration cytology(FNNAC) with that of fine-needle aspiration cytology(FNAC) of thyroid lesions as regards to cellular and hemorrhagic yield

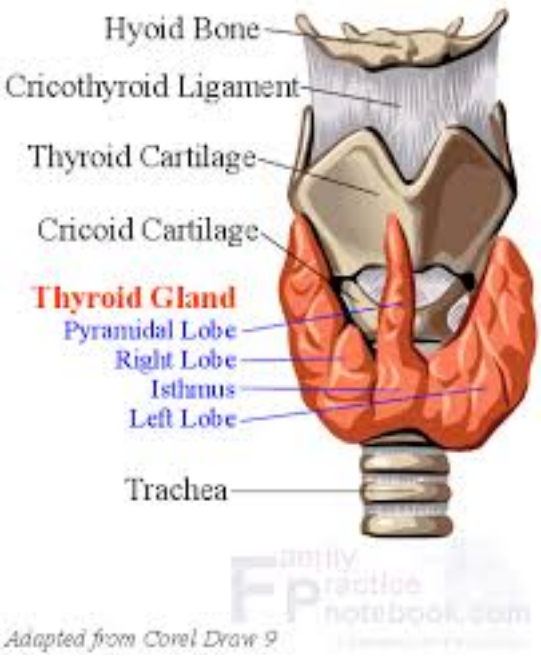
2. To evaluate the efficacy of fine-needle non-aspiration cytology(FNNAC) with that of USG guided FNAC in thyroid lesions as regards to cellular and hemorrhagic yield.

REVIEW OF LITERATURE

The thyroid gland is an unique endocrine gland. It is the first endocrine gland to appear in the foetus. It is the largest amongthe endocrine glands ,weighing about 20 to 25grams . Its another peculiarity is its superficial location because of which it is amenable to direct physical examination.

SURGICAL ANATOMY OF THE THYROID GLAND

FIGURE -1 ANATOMY OF THYROID GLAND

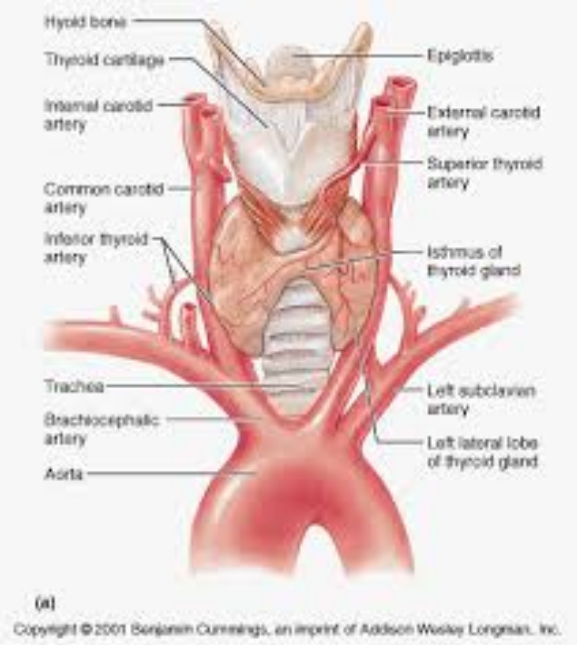


The thyroid gland is a butterfly shaped endocrine organ, situated in the anterior aspect of neck,with two bulky lateral lobes which are connected together by a relatively thin isthmus, which extends from the second to the fourth tracheal rings. The left lobe is usually shorter than the right lobe. Another lobe called the pyramidal lobe, the vestigial remnant of thyroglossal duct may extend from the isthmus and is seen in approximately 40 to 55% of cases.

The gland is enclosed by a fibrous capsule which is then enveloped by the visceral layer of the pre tracheal layer of deep cervical fascia. The pretracheal fascia further gets attached superiorly to the oblique line of thyroid carlilage and posteriorly to the cricoid cartilage and tracheal rings through the Berry's ligament, which is responsible for the movement of thyroid during deglutition.

Thyroid is a richly vascularised organ and there is extensive anastomoses between the main thyroid arteries and branches of the tracheal and esophageal arteries

FIGURE – 2 ARTERIAL SUPPLY OF THYROID

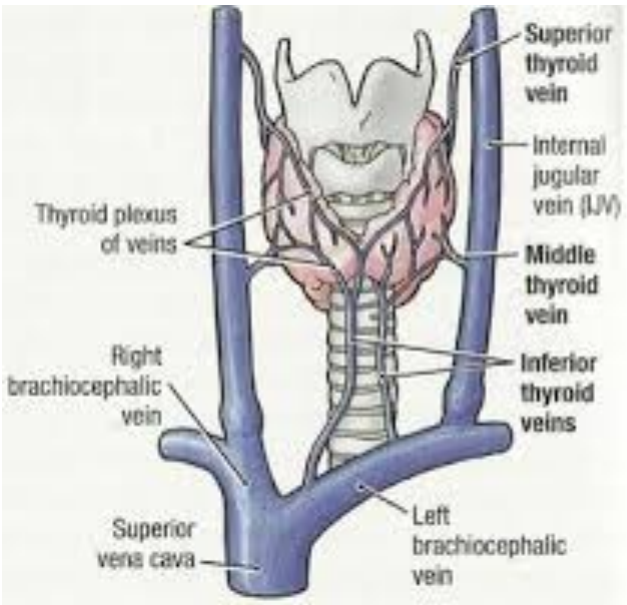


.The superior thyroid artery which is a direct branch of the external carotid artery andthe inferior thyroid artery which is a branch of the thyrocervical trunk of the first part of the subclavian artery constitute the main arterial supply of the gland.

The thyroideaima artery arising from the brachiocephalic trunk may be seen in 10% of cases and it supplies the inferior portion of the isthmus. The superior thyroid artery has closerelation with the external

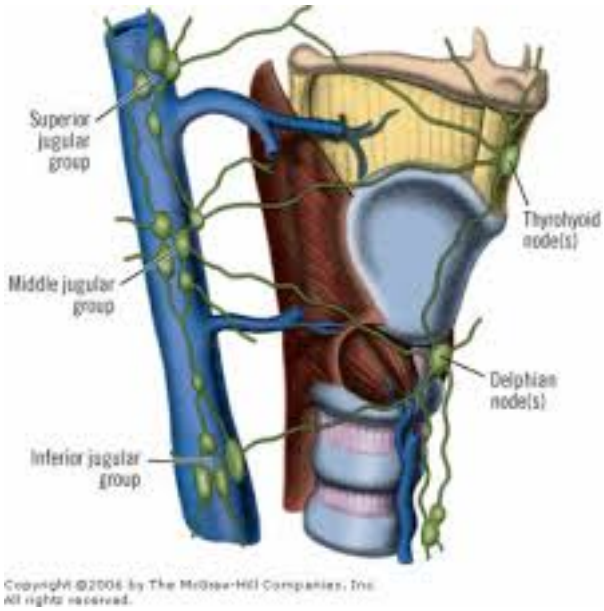
branch of superior laryngeal nerve and inferior thyroid artery with the recurrent laryngeal nerve.

FIGURE – 3 VENOUS DRAINAGE OF THYROID GLAND



The superior and middle thyroid veins which drain into the internal jugular and the inferior thyroid vein which drains into the brachiocephalic vein constitute the venous drainage of the thyroid gland.

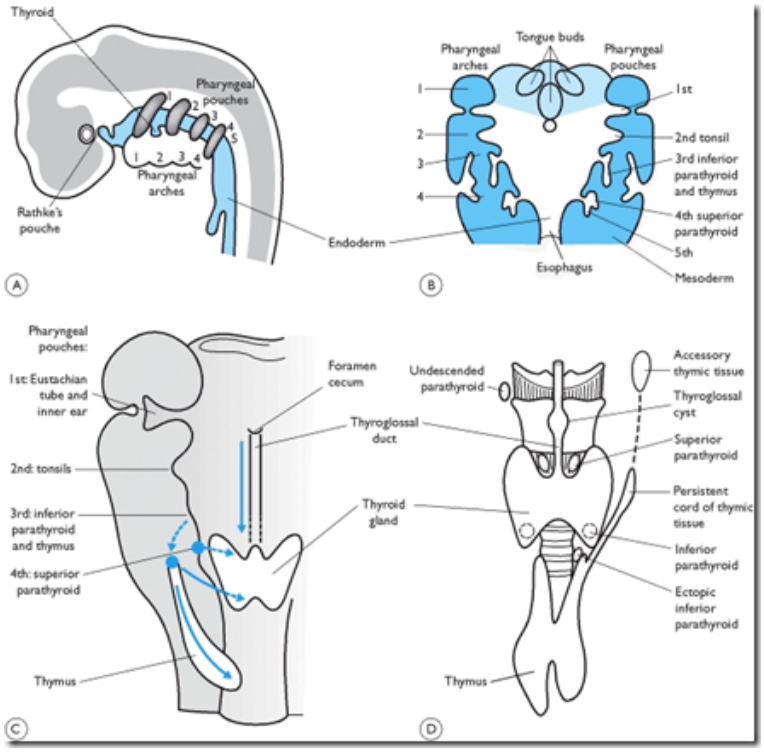
FIGURE - 4 LYMPHATIC DRAINAGE OF THYROID GLAND



The rich lymphatic network of thyroid drains into central compartment level VI nodes_ the Delphian nodes(prelaryngeal), pretrachealand paratracheal lymph nodes which inturn drains into the level II,III,IV,V deep cervical nodes and level VII mediastinal nodes.

EMBRYOLOGY

FIGURE – 5 EMBRYOLOGY OF THYROID GLAND



The thyroid anlage develops in the embryo as a midline structure from the median bud in the floor of the pharynx between the tuberculum impar and the cupola . The gland is mainly endodermal in origin. It descends down the neck, in front of the hyoid bone and thyroid cartilage during which it remains connected to the tongue at the foramen caecum by the thyroglossal duct. The duct usually closes at the fifth week, the

failure of which results in the formation of thyroglossal cyst. Ectopic thyroid results from arrest in the descent of the gland whereas complete failure of descent results in lingual thyroid. By the seventh week, the thyroid reaches its normal position below the cricoid cartilage. Follicles appear and thyroid begins to secrete hormones by the twelfth week.

The parafollicular C cells derived from neural crest develops from the ultimo bronchial body,which in turn is derived from the fourth and fifth pharyngeal pouch, and becomes incorporated into the lateral portion of the thyroid and secretes calcitonin. Sometimes , the ultimobronchial body canpersist as a small nodule called the tubercle of Zuckerkandl. Failure of fusion of the lateral anlage with ultimobranchial body results in the formation of lateral aberrant thyroid.

HISTOLOGY

The thyroid gland is enclosed by a thin fibrous capsule. From this capsule, numerous trabeculae of various thickness invades the thyroid parenchyma and divides it into lobules. Each lobule is supplied by a single arteriole and forms the functioning unit and consists of approximately 24-40 individual follicles. Each follicle is lined by

basement membrane and a single layer of cuboidal epithelial cells and is filled with a structure less colloid in the central lumen . The follicular cells secrete and store their products in the colloid which is composed of thyroglobulin. In between the follicles, clusters of pale epithelial cells called the parafollicular cells or C-cells are seen.

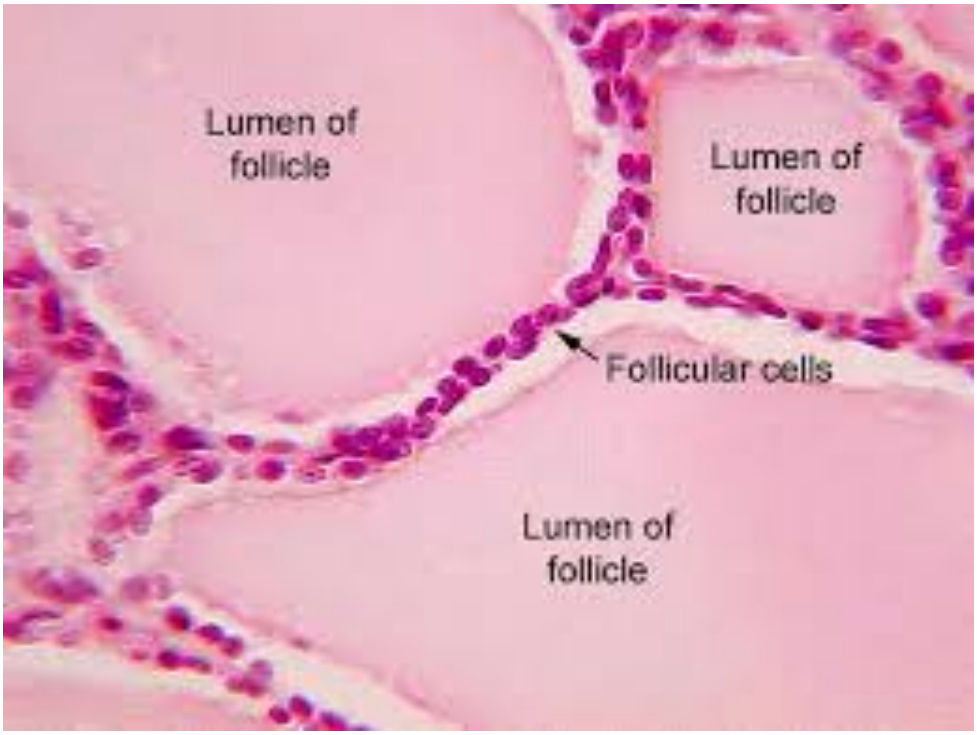


FIGURE – 6 HISTOLOGY OF THYROID GLAND

BIOCHEMISTRY

The basic functional unit of the thyroid is the thyroid follicular cells which synthesise thyroid hormone in four stages which include

i. ***Iodide trapping*** – Active ATP dependent transport of iodide into the follicular cells from the blood

ii. ***Organification*** –the enzyme thyroid peroxidase oxidises the iodide which is then combined with tyrosine to form the inactive iodotyrosines – 3 Monoiodotyrosine and 3-5-Diiodotyrosine. These iodotyrosines are incorporated into thyroglobulin and stored as colloid in the follicular lumen.

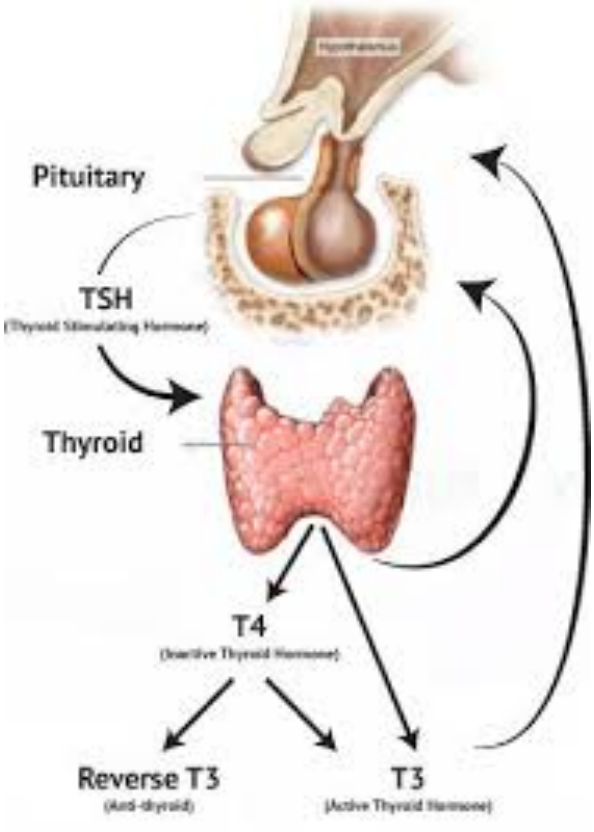
iii. ***Coupling*** - the iodotyrosines are then coupled to form T3(triiodothyronine) and T4(thyroxine) .

iv. ***Release*** – when hormones are required, colloid is taken up by the thyroid follicular cell by endocytosis resulting in the formation of endosomes. The thyroglobulin is then hydrolysed to liberate T4, T3, Mono and diiodotyrosines. Iodine dehalogenase deiodinates the monoand diiodotyrosinesand the released iodide is reused. The active hormones thus formed are secreted into the blood.

PHYSIOLOGY

Most of T3 and T4 in circulation are bound to serum proteins: albumin, thyroxine binding globulin(TBG) and thyroxine binding prealbumin(TBPA). Metabolically active hormones are the unbound free T4 and T3 which constitutes 0.03 and 0.3 percent of the total circulating hormones respectively. T3 is more potent than T4 and these hormones act predominantly via a nuclear thyroid receptor. T4 is relatively inactive in the periphery due to its low affinity to the receptor . T3 can be produced in periphery from conversion of T4. T3 acts faster within a few hours whereas T4 action is slower(4 to 14 days). Thyroid hormone synthesis and release is largely regulated by TSH secreted by the anterior pituitary. TSH acts by binding to TSH receptor on the follicular cell resulting in increased thyroid hormone synthesis via cAMP. TRH acts as a positive stimulus to the production of TSH. TRH produced in the paraventricular nucleus of the hypothalamus passes through the median eminence to the anterior pituitary via the hypophyseal portal system. T3 has a negative feedback on both the anterior pituitary and the hypothalamus. The parafollicular cells secrete calcitonin which is a sensitive tumour marker for medullary thyroid carcinoma.

FIGURE – 7 PHYSIOLOGY OF THYROID GLAND



PATHOGENESIS OF GOITRE

Simple goitre results from increased stimulation of thyroid gland by TSH, leading to follicular cell hyperplasia and hypertrophy which may be due to

1. Increased demand for hormones in physiological states like pregnancy and puberty

2. Iodine deficiency

3. Dyshormonogenesis-Enzyme deficiencies resulting in impaired hormone synthesis and transport

4.Goitrogens- Dietary substances – calcium, fluorides, cabbage, thiocyanates in cassava.

5. Destruction of gland by auto antibodies.

6. Stimulation of TSH receptor by auto antibodies as in Graves disease-toxic goitre.

Nearly all long standing simple goitres become transformed into multi nodular goitres. Normal thyroid cells are heterogenous with respect to iodinating capacity, peroxidase content, endocytic response to TSH and ability to replicate. With fluctuating TSH stimulation , there is a mixed pattern with areas of active lobules and areas of inactive lobules. The development of nodules indicates the generation of new heterogeneous follicles derived from genetically distinct cells and cell clusters in the normal gland. Active lobules continue to grow until haemorrhage occurs causing caseous necrosis, scarring and calcifications. Necrotic lobules coalesce to form nodules which may contain colloid or inactive

follicles.Thus in MNG, most nodules are inactive and active follicles are seen only in internodular tissue.

CYTOPATHOLOGY

Structures that can be normally seen in a smear are

1. Follicular epithelial cells

2. Colloid

3. C-Cells .

Cartilage, Tracheal epithelium and skeletal muscle may also be seen.

HISTORY OF FINE NEEDLE CYTOLOGY:

During Medieval times, AbulCasim (1013 – 1107AD),an Arabian physician described a technique of needle puncture of thyroid to diagnose different types of goitre.

The technique of Needle aspiration biopsy was first recorded by Kun in 1847. In 1853, Pravazused a metallic syringe for the treatment of aneurysms. Leyden used trans thoracic needle aspiration to identify organisms from pneumonia patients. In 1884, Kronigdiagnosed lung cancer by aspirating tissue through a transthoracically inserted cannula. In 1904, Greig and Gray did lymph node aspiration to isolate causative agents of trypanosomiasis . During this aspiration he observed that the cells aspirated from lymph nodes might help in diagnosis.

In the late 1920s and 1930s, there was flowering of interest in the papers of Dudgeon and Patrick from England who studied cytologic scrap preparations from the excised tissues and proposed needling of tumours as a means of rapid diagnosis. Guthrie in 1921 successfully used needle aspiration for the diagnosis of syphilis, tuberculosis, lymphomas and metastatic carcinoma. During the same period (late 1920s), Papanicaloupresented his paper “new cancer diagnosis”, later known as pap smear,thusmaking a great contribution to the field of exfoliative

cytopathology. Pap smear was used both as screening and diagnostic test for cervical cancer.

HISTORY OF FINE NEEDLE CYTOLOGY OF THYROID:

In 1930, Martin , Stewart and Ellis from the Memorial Sloan - Kettering Hospital of the United States described the diagnosis of Thyroid nodules by needle aspiration biopsy . They used a thicker needle (18 gauge) for aspiration. But this technique did not gain wide acceptance during their times because of fear of malignant implant along the needle tract .

In 1960s, the Europeans particularly Scandinavians reintroduced a special aspiration biopsy for diagnosing thyroid lesions where they used a finer needle ie, 22 – 25 gauge for aspiration. The FNAC technique which was described by Lowhagen et al from Karolinska Hospital is generally adopted now.

In 1977, Marvin et al of France emphasized the importance of FNAC in pre-operative diagnosis of thyroid nodules.

In India, the first major study in FNAC was done by Rao SK et al , where he evaluated 341 cases of solitary thyroid nodules over a period

of 10 years from 1957 to 1966. However FNAC became widely accepted in North America and India after 5 decades in the 1980s.

Since 1981 , a modified technique of FNC termed as Fine Needle Non Aspiration Cytology(FNNAC)was introduced in France by Zajdela et al. The same procedure was called as “cyto puncture ” by Brifford et al in 1982.

FNAC THYROID-LITERATURE:

Studies by Smeds et al shows that in the evaluation of nodular thyroid lesions , aspiration cytology is a safe and hitherto the best diagnostic tool. While comparing FNAC with imaging procedures, including those imaging for functional activity, the combined sensitivity and specificity rates of aspiration cytology comes closer to the ideal discriminatory situation. History , clinical examination and fine needle aspiration cytology in combination gives the best guidance for optimal selection of patient for therapeutic and diagnostic surgery.

Agrawal studied the diagnostic accuracy of FNAC in the evaluation of thyroid nodules in 100 consecutive cases who subsequently underwent thyroidectomy between the years 1989 – 1991. FNAC as a diagnostic test for thyroid nodules gave 90.9% sensitivity , specificity of 95.9% , false positivity of 2%, false negativity of 4% and positive and negative

predictive values of 86.7% and 92.2% respectively. An accurate classification of the type of carcinoma was feasible only in 69% of patients. FNAC is the first line investigation in most non – toxic nodular goitres and often the only procedure that was necessary to obtain a correct diagnosis.

Ng et al analysed the cost effectiveness of FNAC as a selection criteria for surgery in solitary nodules in comparison to scintigraphy and ultrasonography. Age above 50 years , clinical suspicion and FNAC in combination detected all malignancies and resulted in fewer patients undergoing surgery. Hence they recommended FNAC as a diagnostic modality for routine use.

Lowhagen and Williams assessed the role of fine needle cytology in the management of thyroid diseases. With the combined use of aspiration cytology and scinti scans, it is possible to differentiate between non neoplastic and neoplastic follicular proliferation. In cases where cytological study is unable togive a specific or conclusive diagnosis, broad disease categories such as inflammatory or neoplastic states can be recognized. In post therapy follow up, FNAC allows rapid detection of recurrence.

Alka et al studied the role of FNAC in lymphocytic thyroiditis and concluded that FNAC remains the gold standard in comparison to ultrasonography and radio nuclide parameters. However the grades of thyroiditis does not correlate with the above parameters.

CURRENT USE AND ADVANTAGES OF FNAC:

Therefore,Fine Needle Aspiration Cytology has now become the initial investigation of choice in patients with thyroid swellings. It is simple, accurate, cost effective, safe and quick to perform in outpatient department with high degree of sensitivity and specificity. It has got excellent patient acceptance.

The main indications for Fine Needle Aspiration Cytology are

1.In the diagnosis of diffuse non – toxic goitre by distinguishing colloid goitre from autoimmune thyroiditis.

2. In solitary nodular lesions and in recurrent goitre by distinguishing between malignant and benign lesions thereby avoiding unnecessary surgery for a benign lesion.

3. In confirming clinically obvious malignancy thereby in planning the type of surgery

4. To obtain material for special laboratory investigations that are aimed at deciding the prognosis.

Thyroid conditions that can be diagnosed with FNAC are colloid nodules,thyroiditis,medullary carcinoma, papillary carcinoma, anaplastic carcinoma and lymphoma.

THYROID LESIONS

NON NEOPLASTIC LESIONSNEOPLASTIC LESIONS

1. Infectious Thyroiditis**1.*****Benign***

- Acute Thyroiditis
- Follicular adenoma

- Chronic Thyroiditis
- Hurthlecell Adenoma

2.***Hashimato Thyroiditis*****2. *****Malignant lesions***

3.Subacute Thyroiditis - Papillary Carcinoma

4.***Grave's Disease*** - Medullary Carcinoma

5.***Goitre***- Follicular Carcinoma

- Diffuse non toxicgoiter
- Anaplastic Carcinoma

- Multi Nodular goiter

CYTOLOGICAL APPEARANCE OF VARIOUS THYROID LESIONS:

SUBACUTE GRANULOMATOUS THYROIDITIS(DE QUERVAIN`S THYROIDITIS)

- Large multinucleate giant cell with numerous nuclei, phagocytosed colloid
- Epithelioid cells
- Degenerating follicular cells
- Inflammatory cells, macrophages and lymphocytes
- A dirty background of debris and colloid.

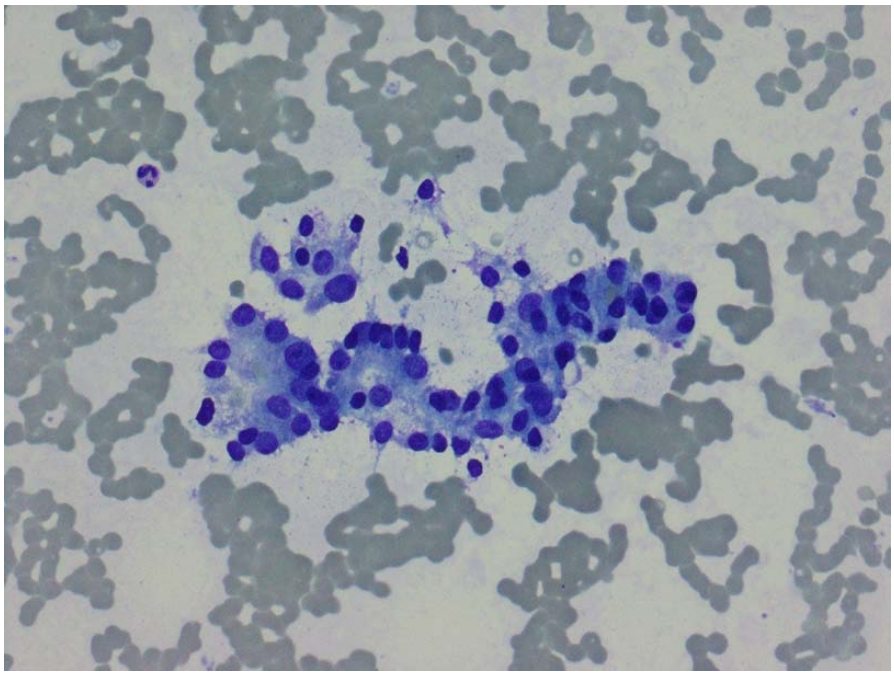
HASHIMOTO THYROIDITIS. (HASHIMOTO'S DISEASE, STRUMA LYMPHOMATOSA)

- Oxyphilic transformation of epithelial cells (askanazy cells)
- Moderate number of lymphocytes and plasma cells
- Scanty or no colloid

GRAVES' DISEASE - (DIFFUSE TOXIC GOITER)

- Blood stained smear with scanty colloid
- Moderate amounts of thyroid follicular epithelial cells
- Cells have abundant vacuolated pale cytoplasm with mild nuclear enlargement and showing moderate anisokaryosis.
- Fire flares/colloid suds/marginal vacuoles

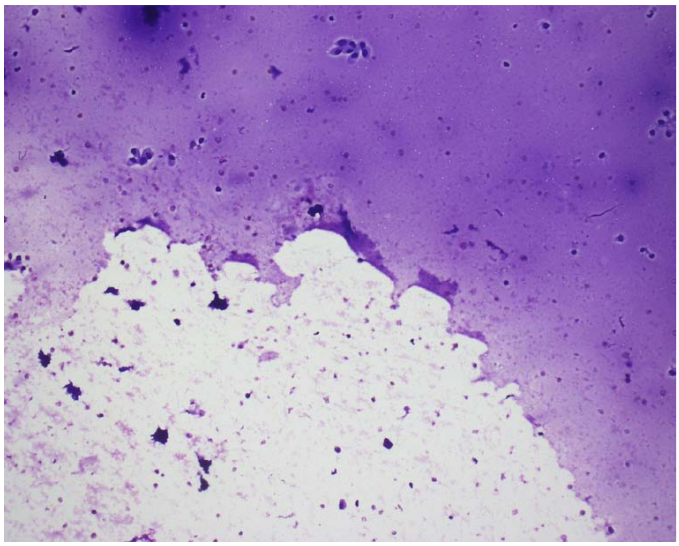
FIGURE – 8 GRAVE'S DISEASE



DIFFUSE NONTOXIC GOITER (SIMPLE GOITER)

- Abundant colloid of varying thickness or excessive thick colloid with normal Cytological appearance of follicular cells.

FIGURE – 9 COLLOID GOITRE



MULTINODULAR GOITER

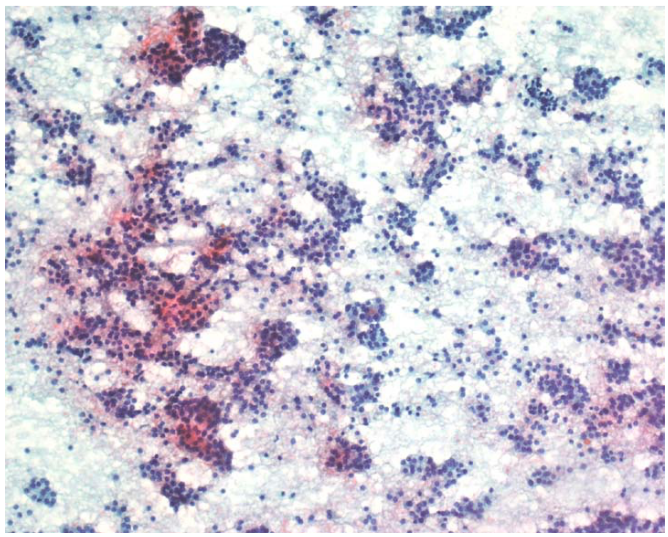
- Abundant thin and thick colloid.
- Small to moderate number of follicular epithelial cells in monolayered sheets, poorly cohesive groups and single cells.
- Both Involutional and hyperplastic follicular epithelial cells often some Oxyphilic cells.
- Fragile cytoplasm.

- Variable number of histiocytes.
- Degenerative changes:oldblood,debris.

FOLLICULAR ADENOMA

- Cellular often bloody smear
- Many equal sized epithelial cell clusters scattered throughout the smear.
- Syncytial aggregates, nuclear crowding and overlapping.
- Micro follicles.
- Scanty or no colloid.

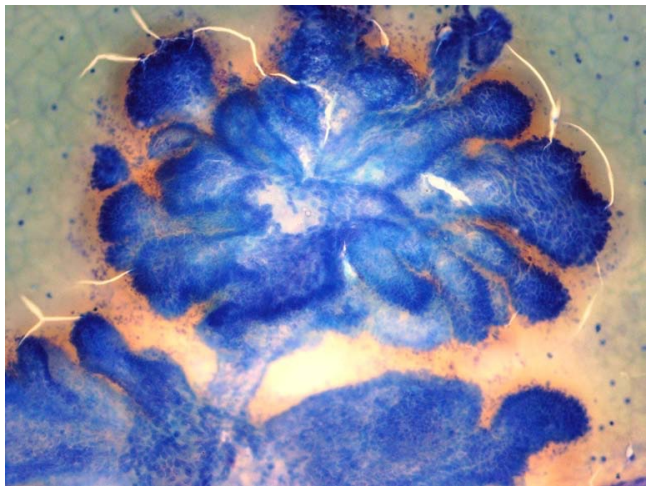
FIGURE 10 – FOLLICULAR NEOPLASM



PAPILLARY CARCINOMA

- Cellular smears
- Syncytial aggregates and sheets of cells with a distinct anatomical border.
- Papillary tissue fragments with or without a fibrovascular core
- Enlarged ovoid strikingly pale nuclei, finely granular powdery chromatin
- Multiple distinct nucleoli , intranuclear cytoplasmic inclusions and nuclear grooves
- Dense cytoplasm with distinct cell border.

FIGURE 11 – PAPILLARY CARCINOMA THYROID

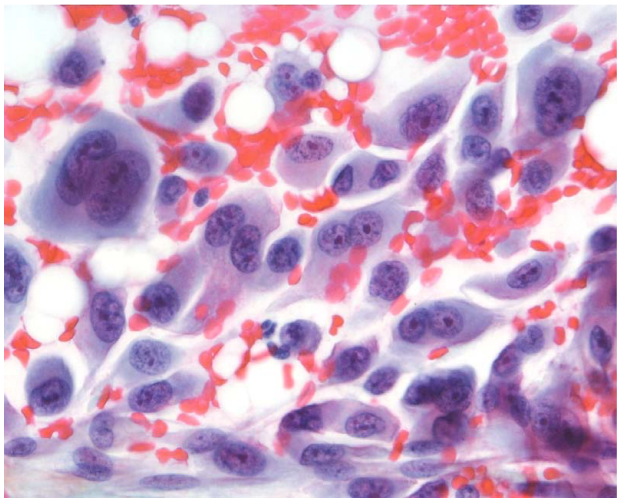


- Scanty viscous and stringy colloid(chewing gum colloid)
- Squamoid or histiocyte-like metaplastic epithelial cells
- Psammoma bodies
- Macrophages and debris

ANAPLASTIC (UNDIFFERENTIATED) CARCINOMA

- Highly cellular with bizarre large malignant cells showing epithelial or spindle sarcomatoid type.
- Prominent nuclear pleomorphism,multinucleation and mitotic figures
- Background shows necrotic cell fragments and debris

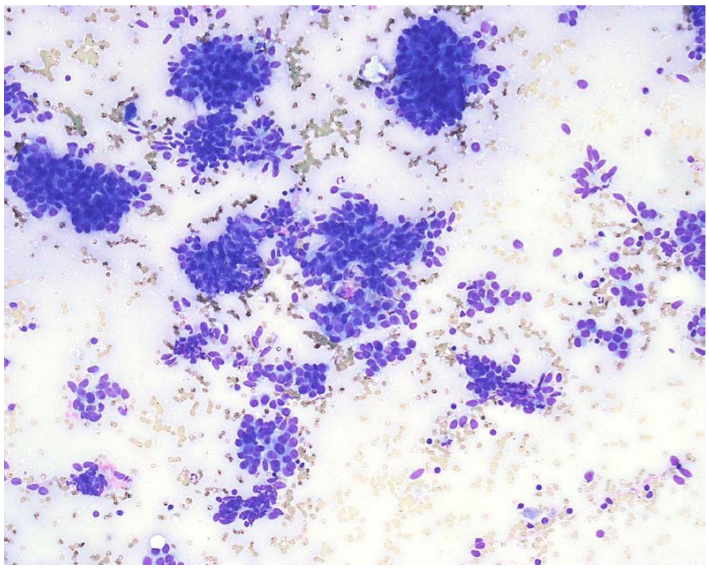
FIGURE – 12 ANAPLASTIC CARCINOMA



MEDULLARY CARCINOMA OF THYROID GLAND

- Cellular smears with dispersed cells, some clustering may be seen .
- Variable cell pattern showing plasmacytoid, spindle and small cells
- Moderate anisokaryosis, occasional scattered very large nuclei with bi and multinucleate forms
- Uniform stippled nuclear chromatin
- Amorphous pink/violet background (amyloid)

FIGURE 13 – MEDULLARY CARCINOMA



LIMITATIONS OF FNAC

Awareness of the limitations of any diagnostic procedure is most important and it should be stressed that Fine needle aspiration cytology is not a substitute for conventional surgical histopathological examination.

FNAC can give indeterminate results as it cannot distinguish follicular adenoma which is benign from follicular carcinoma , as this differentiation is based not on cytology but on the histological criteria of capsular and vascular invasion .

The two fundamental elements required for the success of FNAC are proper representation of the sample and high quality of smear preparations. Risk of unsatisfactory aspirates is more common with cystic and partly cystic swellings leading to false negativity. Another obstacle in proper cytological interpretation is an unsatisfactory specimen mixed with blood.

Lowhagen T et al (1979) commented that even in the hands of experienced cytopathologist ,about 5-10% of malignancies cannot be diagnosed by FNAC. The greatest risk of a false negative diagnosis occurs with cystic neoplasms especially cystic papillary carcinoma.

Over 40% of cystic neoplasms may be missed by Fine Needle Aspiration Cytology.

In a six year study of clinically isolated thyroid swelling,Cusick observed that 148 of 395 swellings were cystic. When 106 (72%) out of the 148 patients with cystic swelling were operated upon, 47% of cystic swellings were neoplastic , of which 14% were malignant. Only 12 cystic lesions were permanently abolished by aspiration and FNAC was inaccurate in predicting neoplasia. The incidence malignancy in cystic lesions is higher than generally accepted and most cysts that could not be abolished by aspiration should be removed.

La Rosa et al (1991) observed a high false negative rate of 6.4% for cystic nodules where as it was only 1.4% for solid nodules. False negative diagnoses can also arise from inadequate samples, improper sampling technique, dual pathology (example a dominant benign nodule may obscure a smaller or more diffusely growing carcinoma) and errors in interpretation.

Layfield et al evaluated the usefulness of clinical features for selecting patients with thyroid lesions who are suitable for diagnosis by FNAC. They found that the only clinical feature that was of statistical value in the distinction of benign from malignant nodule is the presence of

lymphadenopathy. Moreover once an aspiration diagnosis of follicular neoplasm had been made, no clinical, radiological or laboratory test helped in the distinction of follicular adenoma from follicular carcinoma.

Nari et al have found that identification of various variants of papillary carcinoma is faesible, though difficulty has been encountered in correctly categorising the follicular variant which is mistaken as follicular neoplasm.

Procedural complications of thyroid FNC include hematoma, transient laryngeal nerve palsy, puncture of trachea causing coughing spasms, organisation of hematoma and necrosis which may mimic a sarcoma or angiomatous tumor. Damage to the capsule by needling may resemble capsular invasion.

Another issue is that FNC may cause changes in the tissue like infarction, pseudo capsular invasion, pseudo malignant changes, and reparative reactions which may render subsequent interpretation difficult. So the FNC technique should always be done carefully and gently to minimize tissue damage.

The possibility of dissemination of cancer cells along the needle tract initially caused a great deal of concern, but the review of literature on the reported cases of tumor implantation along the needle tract by

Roussel et al in 1989 and Power et al in 1996, proved that the risk of needle tract seeding is extremely low inwhen truly a fine needle(22-25 gauge) is used. Multiple passes , larger needles and absence of normal parenchyma covering the lesion are factors which increase the risk.

FINE NEEDLE NON-ASPIRATION CYTOLOGY OF THYROID:

Fine needle aspiration cytology involves aspiration of cellular material from target masses by using high suction pressure with the help of needle and syringe. However, FNA has a disadvantage of inadequate and bloody samples as thyroid is a highly vascular organ. As the cytologists faced difficulty in interpreting haemorrhagic samples from FNAC of thyroid or other vascular organs, an alternative sampling technique of FNC termed as fine needle non-aspiration cytology (FNNAC) or fine needle capillary sampling was introduced in France by Zajdela et alin 1981. In 1982,the same procedure was called by Brifford et al as “cyto puncture ”. It was first used for breast tumours and later for orbital and periorbital tumours. In FNNAC , active aspiration by syringe is replaced by the principle of capillary suction of fluid or semi fluid material into a thin channel (fine needle) thereby overcoming the problems of inadequate and bloody samples .

Relative to FNAC , FNNAC is technically less painful, less traumatic and patient-friendly and the smears obtained by FNNAC are of “text book” quality.

Santos and Leiman et al, in 1988 were the first to compare FNAC wity FNNAC smear in thyroid nodules. They observed that the number of unsuitable specimens was not different with both the techniques. Based on certain criteria,they graded the specimens into

Unsuitable – If the smears showed predominantly blood or if cellular material was absent.

Diagnostically adequate - If the smears were adequate enough to render the diagnosis, but the cellularity is suboptimal and if there was degenerative changes or specimen entrapment in clots.

Diagnostically superior - If the cells or cell groups are concentrated , well preserved , unobscured by background blood and excellently displayed with retention of architectural structures such as follicles, papillae and flat sheets.

Sharon Mair and Fiona Dunbar et al in 1989 did their comparative study of FNAC and FNNAC and the smears were scored on the based five objective parameters_ amount of cellular material , retention of

architecture, degree of trauma, degree of cellular degeneration and background blood or clot .

The smears were then classified as

1. Diagnostically Unsuitable -- score 0-2.

2. Diagnostically Adequate -- score 3- 6.

3. Diagnostically superior – score 7-10.

This study concluded though there was no statistical difference between the efficacy of FNAC and FNNAC, FNNAC smears were diagnostically superior and of text book quality and it allows for greater ease of sampling and a more sensitive probing of the mass to be sampled. FNAC was diagnostic for fibrous and cystic lesions and suggested that the technique of fine needle sampling employed for cytodiagnosis could be left to the personal preference of the operator.

Rajasekhar A and Sundaram C et al in 1991 observed that efficiency of obtaining adequate material for both the techniques was 80% and FNNAC was more cost effective and relatively less painful . The diagnostic accuracy of FNNAC correlated well with that of FNAC and histopathology. Sampling of malignant lesions was more easy. In their

study,anatomic site had no influence on the yield. Most of the negative cases were small swellings, less than 1.5 cm in diameter.

Dey P and Ray R et al in 1993 analysed the quality of diagnostic material of FNAC and FNNAC using a scoring system based on cellularity and amount of blood in the smear . They observed that total score of FNNAC was significantly higher than FNAC. The FNNAC procedure was less traumatic and equally cost effective and can be safely undertaken in liver, orbital and thyroid lesions. However, this procedure could not be advocated in cystic, bony and fibrous lesions.

Kumarasingh M , Sheiffdeen AH et al in 1995 found in their comparative study that FNNAC was superior to FNAC in thyroid whereas FNAC was superior to FNNAC in benign lesions of breast .

Braun H, Walch C, Beham et al in 1997 observed in their comparative study that FNNAC offered several advantages. By avoiding aspiration, trauma to cells and tissues was reduced. Less blood in the samples resulted in better quality of the cytological smear. These circumstances made it easier for the pathologist to comment accurately on the cytological findings. The handling of the needle was practised with a wrist movement and not from the shoulder joint as in aspiration method

using the Cameco syringe holder. This allowed for a more sensitive puncture technique touching the lesion with the finger tips during sampling. The puncture resulted in less pain than the aspiration technique.

Amrita Ghosh , Rajiv kumarMisra et al in 2000 observed in theirbcomparative study that in lymphnode, thyroid and liver lesions contamination with blood was more in aspiration smears than FNNAC smears and values were statistically significant. Statistically significant better maintenance of architecture was observed for thyroid lesions sampled by FNNAC technique. Better average scores were observed by FNNAC technique for lymphnode and thyroid . On categorizing the smears obtained by FNAC & FNNAC on the basis of scores according to predetermined criteria, FNAC yielded greater number of diagnostically adequate specimens but more number of diagnostically superior specimens were obtained by FNNAC technique and the difference was found to be statistically significant. However the number of inadequate smears was also more by FNNAC technique than by FNAC technique.They observed that both the techniques have their own advantages and disadvantages. Therefore they concluded that by combining both the techniques better diagnostic accuracy can be achieved.

Meherbano M Kamal , DilipArjuna et al in 2002 observed in their comparative study for both the techniques in thyroid lesions that a statistically significant difference in favour of FNNAC was observed for the criteria of amount of cellular material. For the rest of the criteria namely, background blood or clot, degree of cellular trauma ,degree of cellular degeneration and retention of architecture—FNNAC gained a higher average score but was not statistically significant--i.e., smears prepared from FNNAC showed cellular material that was more concentrated, less damaged and less likely to be obscured by blood. They concluded that although FNNAC sampling was diagnostic in a greater number of cases than FNAC sampling, a clear superiority of FNNAC over FNAC is not proved . They also suggested that until further experience proves clear sampling superiority of FNNAC alone,instead of performing only FNNAC in diffuse or nodular thyroid lesions, incorporating FNAC into the second puncture , will definitely improve the quality and quantity of material at the patient's first visit.

C V Raghuveer I Leeka et al in 2002 found in their comparative study that FNNAC was superior in quality and diagnostic accuracy than FNAC in thyroid lesions. FNNAC seemed to be better for diagnosing malignant lesions while FNACappeared better for diagnosing benign ones. FNNAC technique was more patient friendly and gave "text book" quality smears

while FNAC smears gave quantitatively more adequate material. Therefore both the techniques would be complementary to each other.

ShahramHadadiNizhad, BagherLarijani et al in 2003 designed a comparative study in thyroid lesions . The specimens were scored (0, 1, or 2) on the basis of background blood or clot, number of obtained cells, preserved architecture of papillae and follicles, and cellular degeneration. They concluded that FNNA is not superior to FNA in the cytopathologic studies of thyroid nodules.

Ceresine G, Corcione L et al in 2004 observed that inadequate samples may occur in thyroid FNAC leading to a repetition of the procedure with the consequenceof patients' discomfort and poor compliance. They concluded that the combination of US guidance, capillary collection with no-aspiration technique, and onsite review of slides, characterizes an advantageous method for thyroid nodule fineneedle biopsy.

Yasub E Al Khattab et al in 2004 observed that each sampling technique has its own advantages and disadvantages and to choose one of them was based on the operator’s personal preference . They suggested that if only one needle pass was to be performed or to minimize the patient discomfort or to reduce the screening time, FNAC probably has greater chance of producing a diagnosis than FNNAC.

S A Ali Rizvi , M Hussain et al in 2005 observed that the non-aspiration technique yielded more diagnostically adequate specimens in thyroid lesions, as compared with FNAC. The number of unsuitable smears was also greater in aspiration samples, as compared with the non-aspiration technique. The non-aspiration technique was simple, easy to perform and produced better results in the form of a better quality of the cellularity and less field obscurity by blood in both neoplastic and non-neoplastic lesions of the thyroid. This technique should be used alone or in tandem with FNAC for better diagnostic yield.

David D Pother , AA Narula et al in 2006 did a literature search and a systematic review was undertaken, looking for prospective trials to compare the two methods . Criteria for inclusion of studies into meta-analysis were: (i) randomised controlled trials or cross-over trials; (ii) blinded randomisation allocation; and (iii) blinded cytopathologist. The outcome measures were: (i) adequacy of sample for diagnosis; and (ii) reliability of diagnosis made.

The following papers fulfilled the inclusion criteria: Haddad-Nezhad et al., Ghosh et al. , Mair et al., Raghuveer et al and Santos and Leiman. All used the same method of double sampling each thyroid lesion by FNAC and FNNAC. The first four studies all used the same technique for assessing the aspirate. This was achieved by the use of a point-scoring

system devised by Mair et al. Santos and Leiman used a different system where each sample was categorised into diagnostic superior, diagnostic or unsuitable. This study was not included in the meta-analysis. Although there have been five high-quality trials on the subject, there was no evidence from a meta-analysis that one method of collection of cytological material was better than another in the investigation of thyroid lesions. Taking into consideration all the data entered into the meta-analysis, there seems to be some evidence favouring FNNAC.

Mitchell E Tubulin, Joseph A Martin et al in 2007 did a study to compare USG guided FNAC and FNNAC in thyroid nodules and observed that the results were comparable with equivalent diagnostic yields. The technical ease of capillary sampling may prompt adoption of FNNAC at high volume endocrine and radiology practices.

Federico Ronietelli , Enrico Distasio et al , in 2009 did a similar comparative study like Mitchell E Tubulin et al ., and found that there was statistical difference between two techniques only on the number of inadequate results. However they concluded that being minimally invasive procedure, better quality of smears and reduced inadequate

results , FNNAC should be preferred for FNAC in cytological evaluation of thyroid nodules.

In a study conducted by Nisha P Malik et al in 2009 , FNAC and FNNAC smears from thyroid nodules were assessed for cellularity,background blood or clot and retention of architecture ,based on which it was categorised into unsuitable, adequate and diagnostically superior for cytological evaluation . They observed that FNAC yielded more cellular material and had a higher score for background blood. FNAC yielded more diagnostically superior samples whereas FNNAC yielded more diagnostically adequate samples. Both the techniques yielded equal number diagnostically unsuitable smears. They concluded that technique of fine needle sampling to be left to the operators' personal preference.

A similar study conducted by Anil Kumar Maurya et al in 2007showed that more number of diagnostically superior samples were obtained with FNNAC whereas FNAC yielded more number of diagnostically adequate smears .The number of unsuitable smears was greater with FNNAC. They concluded that both the techniques have their own merits and demerits and by combining both the techniques ,diagnostic accuracy can be improved.

ULTRASOUND GUIDED FNAC:

One of the major limitations of FNAC thyroid is a high inadequacy rate which ranges from 6.4% to 32.4% in various studies. Although the rate of inadequate aspirate can be reduced by repeated aspiration and experience, it increases the number of patient visits to the clinic , the consequences of which are decreased efficacy and cost effectiveness. It also adds to the anxiety and apprehension of the patient by decreasing the confidence in the surgeon and pathologist. This problem can be overcome by using ultrasound guided FNAC which not only decreases the inadequacy rate but also helps in the accurate selection of patients for surgery ,thereby ,avoiding unnecessary diagnostic thyroidectomies. It helps in careful selection of biopsy site by avoiding cystic areas and areas of coarse calcification. Thus it helps in diagnosing microcarcinomas,cystic carcinomas,cancer associated with benign nodules like Hashimoto”s thyroiditis or coarse calcification.

Miskin and walfish PG of England were the first to design a prospective study by combining ultrasonography with FNAC in cases of hypo functioning thyroid nodules to distinguish benign from malignant nodules.

USG guided FNAC as a diagnostic modality was first introduced by Rizatto et al in 1973.

Takashima et al showed that accuracy, sensitivity, specificity and negative predictive value of USG guided FNAC in diagnosing malignancy were not different from that of blind FNAC significantly. However , the initial failure rate was significantly higher with blind FNAC.

According to Hatada et al, sensitivity, specificity and accuracy was better with USG-FNAC especially when the tumour size is less than 2 cm.

MATERIALS AND METHODS

PLACE OF STUDY:

Department of General Surgery, Govt. Stanley Medical College &Hospital,Chennai

DURATION:

JAN 2015 TO SEP 2015

STUDY DESIGN:

Prospective study

SAMPLE SIZE :75

INCLUSION CRITERIA:

Patients with clinically palpable thyroid swelling

EXCLUSION CRITERIA:

Patients with - Coagulopathty or bleeding diathesis

-Age less than 14 years

METHODOLOGY:

- Patients attending Out patient and In patient Department of General Surgery with clinically palpable thyroid swelling from January 2015 to September 2015 are included in this study
- Patients were randomised into 3 groups_ 25 patients in each group
- After a thorough clinical examination, all the patients in group 1 were subjected to FNAC
- Patients in group 2 were subjected to FNNAC
- Patients in group 3 were subjected to USG guided FNAC
- The details of the technique of Fine needle cytology were explained to the patient and an appropriate consent was obtained from each case before performing the procedure
- After subjecting patients to FNNAC and FNAC using 23 gauge needle,the samples were smeared and air dried and sent to the pathologist.
- Cytological evaluation and reporting was done by pathologist

FINE NEEDLE ASPIRATION CYTOLOGY – PROCEDURE

EQUIPMENTS NEEDED:

- 23 gauge needle
- 10 ml Syringe/syringe holder
- Gloves
- Cotton
- Fixative
- Coplin jars
- Lidocaine
- Skin disinfectant
- Glass slides
- Glass marking pencil
- Sterile test tube for collecting any fluid or pus from cystic lesions.

PATIENT PREPARATION

- A detailed explanation was given to the patient regarding the procedure, number of pricks that would be needed and the possible complications of the procedure and a written consent was obtained.

- With the patient lying supine on the examination couch, the swelling was inspected and then palpated.
- The overlying skin was then cleansed with alcohol.
- A 10 ml plastic syringe attached with a 23 gauge needle was held in the right hand while the nodule was firmly grasped with two fingers of the left hand.
- Needle was rapidly inserted through the skin into the nodule.
- Once the needle tip has reached the nodule, gentle suction was applied while the needle is moved back and forth in the nodule vertically. This manoeuvre allows the dislodging of cellular material and easy suction into the needle .
- During the period of 5-10 passes, suction was maintained and as soon as fluid or aspirate appears in the hub of the needle, the suction was released and the needle was withdrawn .
- The appearance of fluid suggests that nodule is cystic . The suction pressure is maintained to aspirate all the fluid and then FNAC was to be done in the residual lesion or mass. Once the material is seen in the hub of the needle, the needle is taken out of the swelling and detached from the syringe.
- 5 ml of air was drawn into the syringe and the needle was reattached to the syringe and with the level pointing down, drop of

aspirated material was forced onto each of the several glass slides. It is important that all the slides are labelled and placed in order on a nearby table before the aspiration smears are prepared.

FINE NEEDLE NON ASPIRATION CYTOLOGY – PROCEDURE

- For this technique, patient preparation is similar to that of FNAC .
- No syringe or suction is necessary for this technique.
- After identifying the swelling, under sterile aseptic precautions, the hub of the needle is held in a pencil grip fashion in the right hand and the needle was gently inserted into the swelling and then moved in and out over 5-10 seconds rapidly.
- Aspirate flows into the needle through capillary action and as soon as the aspirate appears in the hub , the needle is withdrawn and attached to the syringe with air inside.
- The material from the needle is expelled onto the glass slides using the plunge.
- The procedure is repeated and slides are prepared as that of the FNAC.
- After the procedure is over, firm pressure was applied to the aspirated site with cotton.

- Once the bleeding has stopped, adhesive bandage is placed on it.
- The patient is observed for few minutes and if there are no problems, he/she is allowed to leave.

PREPARATION OF SMEARS

- The aspirate contained in the needle was expelled on to a clean glass slide using air in a syringe, taking care to avoid splashing.
- The smears were prepared by using a second glass slide exerting a light pressure to achieve a thin, even spread, in a manner similar to that of making blood smears. Too firm pressure produces crush artefacts .
- Smears were air dried and the slides were fixed in 85% of the Isopropyl alcohol in Coplin jars and then sent to the pathology department for cytological evaluation.

USG GUIDED FNAC-PROCEDURE

- Written informed consent was obtained from the patient
- Patient was in supine position with neck in extension
- Ultrasonography was performed by radiologist using a 7.5 MHz transducer
- Sterile gel was used as a coupling agent and no local anaesthesia was given
- Under the guidance of radiologist,23 G needle was introduced directly into the lesion through the skin
- The needle was inserted obliquely along a path parallel to the scanning plane ,so that tip and shaft of the needle were visualised continuously.
- When the needle reached the lesion, technique of FNAC was followed.
- All the needle sampling procedures were made by a single operator, bias was thus avoided in all stages of sampling from patient examination to slide smear preparation

STAINING PROCEDURE

- the slides were fixed in 85% Isopropyl alcohol for 20 -30 minutes.
- In the pathology department,the slides were stained with Harris Hematoxylin for 5 to 8 minutes , washed in water, followed by differentiation by dipping in 0.5% acid alcohol for 3 to 5 seconds.
- After rinsing the slides in water, blueing was done by placing the slides in running water for 10 to 20 minutes. Then the slides were dipped in 1% aqueous Eosin once. The slides were then washed in water.
- Finally the slides were dried and mounted in D.P.X.
- The slides were studied and a cytological diagnosis was made
- All the slides were objectively analysed using a point scoring system to enable comparison between FNAC and FNNAC and USG guided FNAC techniques

Scoring system developed by Mair et al to classify quality of cytological aspirate

TABLE -1

Criterion	**Qualitative description**	**Point score**
Background blood or clot	Large amount; great compromise to diagnosis	0
	Moderate amount; diagnosis possible	1
	Minimal diagnosis easy; specimen of 'textbook' quality	2
Amount of cellular material	Minimal to absent; diagnosis not possible	0
	Sufficient for diagnosis	1
	Abundant; diagnosis simple	2
Degree of cellular degeneration	Marked; diagnosis impossible	0
	Moderate; diagnosis possible	1
	Minimal; good preservation; diagnosis easy	2
Degree of cellular trauma	Marked; diagnosis impossible	0
	Moderate; diagnosis possible	1
	Minimal; diagnosis obvious	2
Retention of appropriate architecture	Minimal to absent; non-diagnostic	0
	Moderate; some preservation of, for example, follicles	1
	Excellent architectural display closely reflecting histology; diagnosis obvious	2

On the basis of five criteria tabulated , a cumulative score was obtained for each case which was then categorized accordingly to one of the 3 categories

1. Unsuitable for cytological diagnosis- (0-2)

2. Diagnostically Adequate- (3-6)

3. Diagnostically superior - (7-10)

STATISTICAL FORMULA USED TO ANALYSE THE RESULTS All the results were interpreted statistically using Z test or student's 't'- test

TABLE -2

S.No.	FORMULA &	ABBREVIATIONS
1	Standard error of difference between two proportions	√ [p1q1/n1+ p2q2/n2]
2	Z score for standard error of difference between two proportions	p1-p2/standard error of difference between two proportions
3	P	Probability
4	P<0.05	statistically significant at 5% level
5	P>0.05	Not statistically significant at 5% level
6	p1	proportion of cases (1st category)
7	p2	proportion of cases (2nd category).
8	q 1	1-p1
9	q 2	1-p2

OBSERVATION AND RESULTS

Total number of cases studied : 75

Cases subjected to FNAC: 25

Cases subjected to FNNAC: 25

Cases subjected to USG guided FNAC: 25

- Among the 75 cases of thyroid swelling studied, there were 68 females and 7 males, thus confirming the higher prevalence of thyroid diseases among females.

TABLE -3

SEX	NO. OF CASES	PERCENTAGE
Total	75	100%
Male	7	9%
Female	68	91%

FIGURE - 14

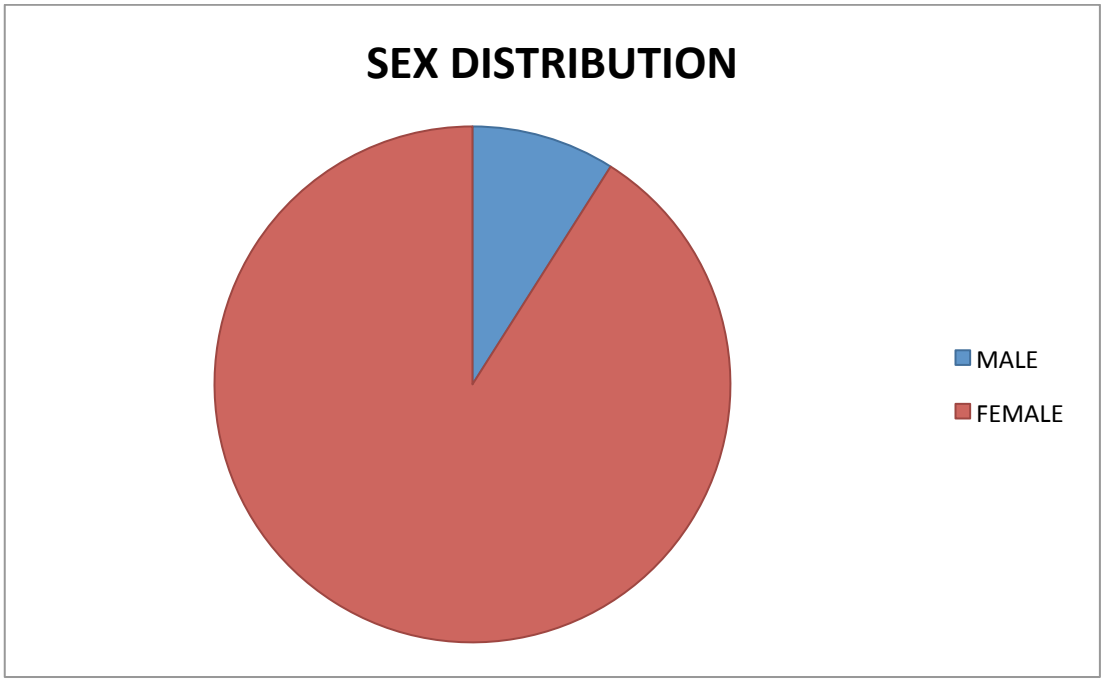
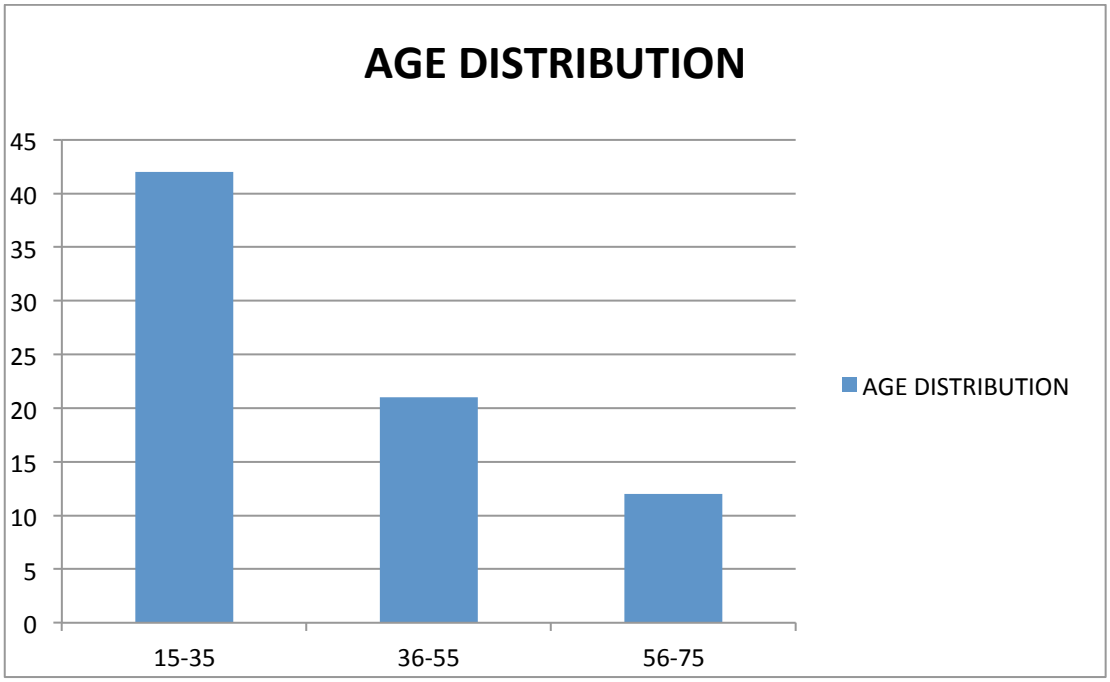


FIGURE - 15



Most of the cases were found to be in the age group of 15 to 35 years.

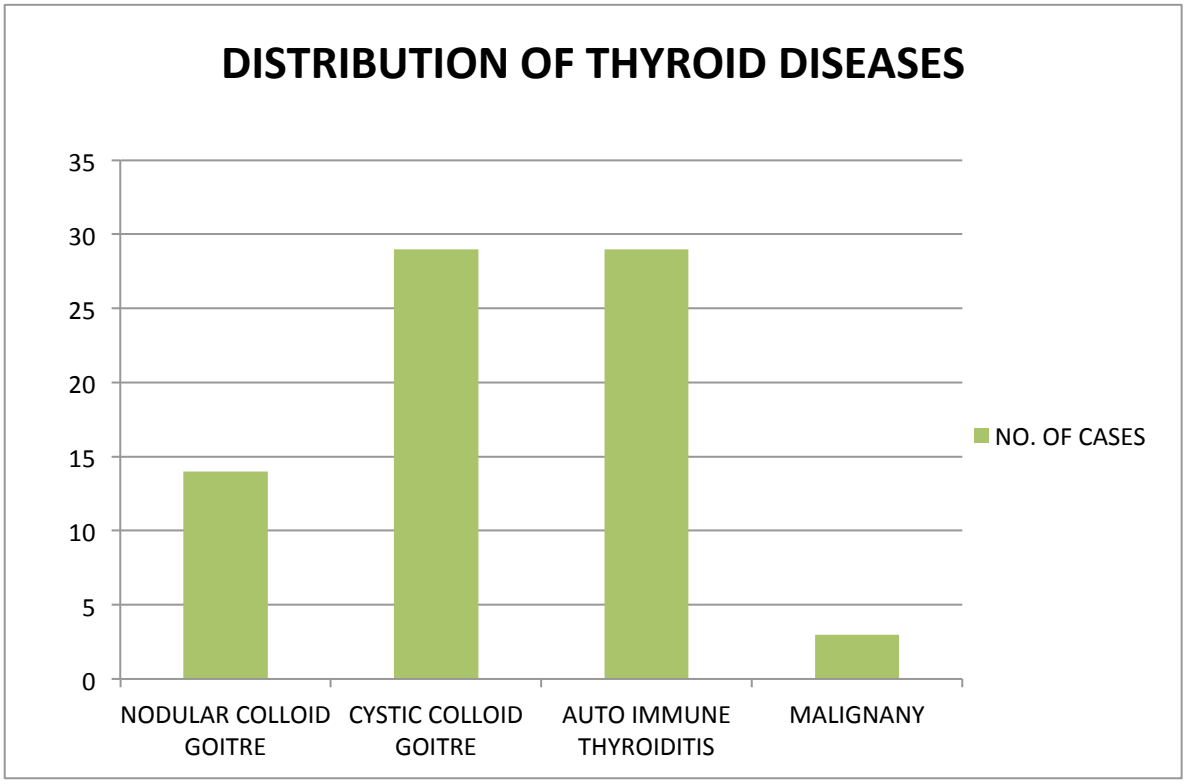
DISTRIBUTION OF THYROID DISEASE

- Out of 75 cases studied,14 cases of nodular colloid goitre,29 cases of cystic colloid goitre, 29 cases of autoimmune thyroiditis and 3 cases of malignancy were noted.

TABLE- 4

Sl. No.	Diagnosis	No. of cases
1	Nodular colloid goitre	14(19%)
2	Cystic colloid goitre	29(39%)
3	Autoimmune thyroiditis	29(39%)
4	Follicular neoplasm	1(1%)
5	Papillary carcinoma	1(1%)
6	Medullary carcinoma	1(1%)
	Total	**75(100%)**

FIGURE - 16


DISTRIBUTION OF THYROID DISEASES
35
30
25
20
15
10
5
0
NODULAR COLLOID GOITRE
CYSTIC COLLOID GOITRE
AUTO IMMUNE THYROIDITIS
MALIGNANY
NO. OF CASES

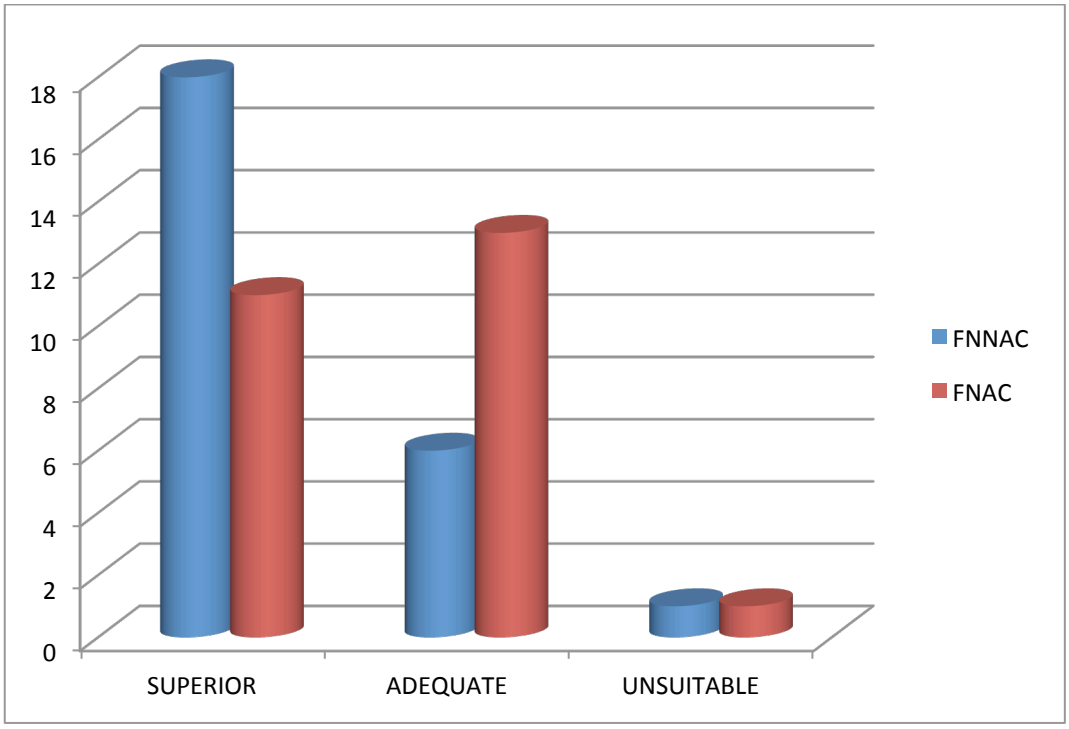
COMPARISON BETWEN FNAC & FNNAC:

- The results obtained from FNAC & FNNAC from thyroid lesion and scoring and grading was done accordingly.
- Analysis showed that more number of diagnostically superior samples were obtained from FNNAC technique than that of FNAC.
- Whereas FNAC has more number of diagnostically adequate samples than that of FNNAC, diagnostically inadequate samples are equal in both FNAC & FNNAC

TABLE – 5

S.NO	GRADING OF SMEARS	FNNAC	FNAC
1	Diagnostically superior	18(72%)	11(44%)
2	Diagnostically adequate	6(24%)	13(52%)
3	Diagnostically unsuitable	1(4%)	1(4%)
4	Total	25	25

FIGURE – 17 GRADING OF SMEARS IN THYROID LESIONS



- Based on comparison of superior quality of smears obtained by FNAC & FNNAC , it was found that more number of superior quality of smears were produced by FNNAC than FNAC and the difference was found to bestatistically significant ($p<0.05$)

TABLE – 6

COMPARISON OF SUPERIOR QUALITY OF SMEAR

FNNAC	*FNAC*	*Z SCORE*	*P VALUE*
18	11	2	P<0.05

For each parameter ,the score obtained was added and an average score for each parameter was obtained in FNAC and FNNAC and tabulated. Total average score was then obtained by adding all the scores in FNAC & FNNAC and was found to be 5.8& 6.5 respectively.

TABLE – 7

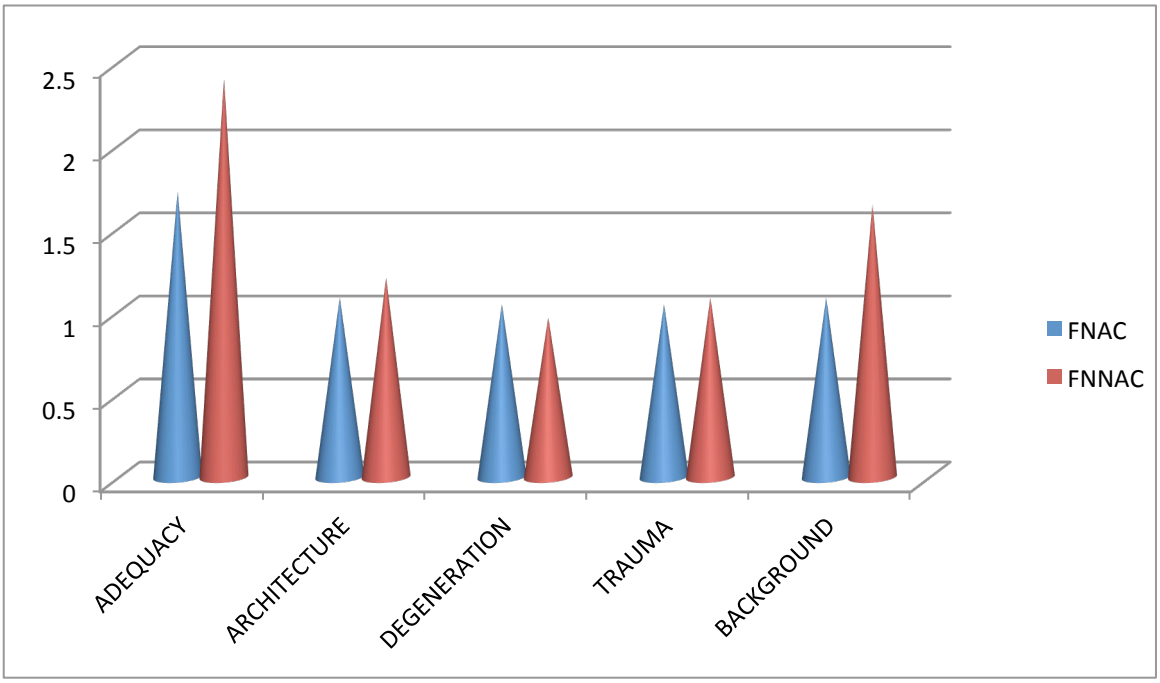
TOTAL AVERAGE SCORE		
1	FNAC	5.8
2	FNNAC	6.3

Based on the average score from each parameters in FNAC & FNNAC of thyroid lesions , it was found that FNNAC score was numerically higher than FNAC.

TABLE - 8

AVERAGE SCORES OF FNAC & FNNAC						
S.NO	**Technique**	**Adequacy**	**Architecture**	**Cellular degeneration**	**Cellular trauma**	**Background of blood**
1	FNAC	1.72	1.08	1.04	1.04	1.08
2	FNNAC	1.84	1.20	0.96	1.08	1.64

FIGURE – 18. AVERAGE SCORE FOR EACH PARAMETER IN FNAC & FNNAC



The diagnostic adequacy was equal in both FNNAC and FNAC techniques in thyroid lesions. The results of both FNAC & FNNAC for diagnostic adequacy were compared, analysed using Z test and found to be statistically insignificant , $P > 0.05$.

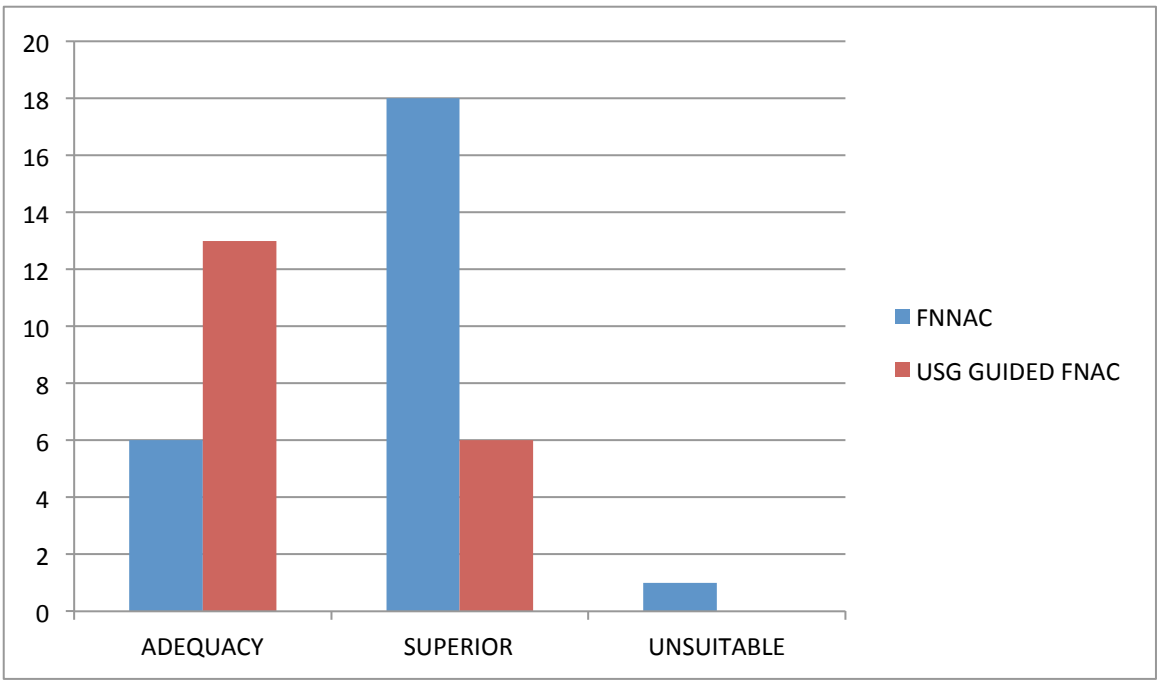
COMPARISON OF FNNAC VS USG GUIDED FNAC:

Out of 50 patients, 25 patients were subjected to FNNAC & 25 patients were subjected to USG guided FNAC from thyroid lesions. The smears was scored and graded accordingly. Based on the results, it was found that superior quality smears were more in FNNAC technique, but diagnostically adequate samples are more in USG guided FNAC than FNNAC.

TABLE – 9

S.NO	GRADING OF SMEARS	FNNAC	USG GUIDED FNAC
1	Diagnostically unsuitable	1(4%)	0(0%)
2	Diagnostically adequate	6(24%)	13(52%)
3	Diagnostically superior	18(72%)	12(48%)
4	**Total**	25	25

FIGURE - 19 GRADING OF SMEARS IN THYROID LESIONS



By comparing superior quality smears obtained by FNNAC and USG guided FNAC , it was found that FNNAC technique produced more number of superior quality smears than USG guided FNAC and the result was found to be statistically significant ($P< 0.05$)

TABLE – 10

COMPARISON OF SUPERIOR QUALITY SMEARS FROM BOTH TECHNIQUES:

FNNAC	USG GUIDED FNAC	Z SCORE	P VALUE
18	**12**	**1.7321**	**P < 0.05**

By summing up all the scores , the score per case and average score for each parameter in each case were obtained and tabulated. The score for FNNAC & USG guided FNAC was found to be 6.3 and 5.9 respectively

TABLE – 11

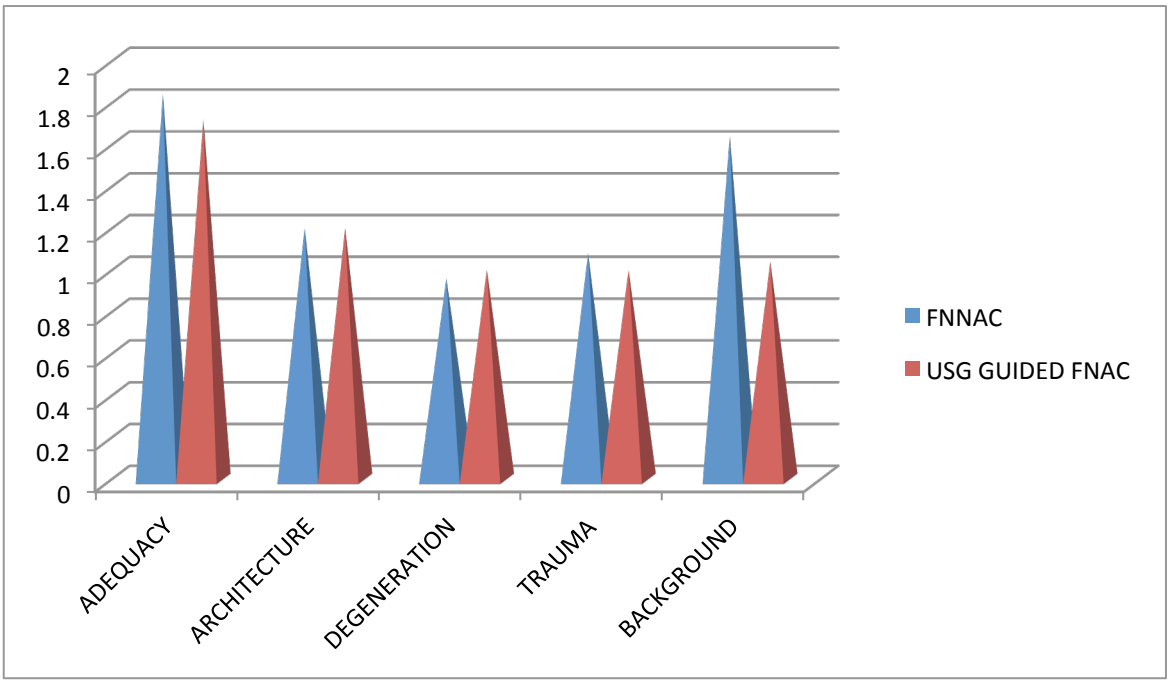
TOTAL AVERAGE SCORE		
1	FNNAC	6.3
2	USG guided FNAC	5.9

The average score between FNNAC &USG GUIDED FNAC for each parameters was calculated and the result was found that scores of FNNAC was numerically higher than USG guided FNAC technique

TABLE – 12

AVERAGE SCORES OF FNNAC & USG GUIDED FNAC						
S.NO	**Technique**	**Adequacy**	**Architecture**	**Cellular degeneration**	**Cellular trauma**	**Background blood**
1	FNNAC	1.84	1.20	0.96	1.08	1.64
2	USG guided FNAC	1.72	1.20	1.0	1.0	1.04

FIGURE - 20 AVERAGE SCORES OF FNNAC & USG GUIDED FNAC



The diagnostic adequacy of both FNNAC & USG guided FNAC was compared . Even though USG guided FNAC has slightly higher value than FNNAC, statistical analysis found it to be statistically insignificant.

The results were compared and analysed based on Z test and result found to be statistically insignificant , ($P > 0.05$).

DISCUSSION

Currently fine needle sampling is a commonly employed technique for cytodiagnosis of thyroid lesions . Malignancy in thyroid is less prevalent (3 to 5%) compared to benign lesions. Arriving at a correct diagnosis by proper utilisation of FNC can thus help in reducing diagnostic thyroidectomies. The underlying principle in fine needle aspiration cytology (FNAC) involves the aspiration of cellular material from target masses by the application of suction pressure. An alternative fine needle sampling technique called fine needle non aspiration cytology (FNNAC), developed in France, in which tumour cells are obtained with a thinner needle by using capillary action. In the present study ,fine needle non aspiration technique is compared to that of blind FNAC and USG guided FNAC to evaluate their efficacy.

This study included the samples collected from 75 patients with thyroid swelling, 25 of which were obtained by blind FNAC, 25 by FNNAC and another 25 by USG guided FNAC.

On the basis of five objective parameters which includes cellular adequacy, retention of architecture, degree of cellular trauma, degree of cellular degeneration and background blood, smears obtained by FNAC & FNNAC were scored according to a scoring system designed by Mairet el in 1989. The number of superior quality smears, total average

score , mean score for each parameter and the diagnostic adequacy were compared and analysed statistically using Z test or student's 't' test .

On considering all the observations and results of each technique in thyroid ,it was found that the number of superior quality smears were more from FNNAC technique (18 Vs 11) and this difference was found to be statistically significant (P<0.05).

TABLE - 13

S.no	Technique	Average score	Diagnostic adequacy	No. of superior quality smears
1	FNNAC	6.3	96%	18(72%)
2	FNAC	5.8	96%	11(44%)
3	P value	P>0.05	P>0.05	P<0.05

The number of unsuitable smears were equal in both the techniques. On analysing the mean score under sub categories like cellular adequacy, retention of architecture, degree of cellular trauma and background blood, scores obtained by FNNAC were numerically higher than FNAC. Particularly the amount of background blood was found to be very less in FNNAC technique. On analysing the average scores , the average

score obtained by FNNAC was more than FNAC (6.3 Vs 5.8). However ,the diagnostic adequacy was found to be the same with both techniques. (96%),thus conferring no statistical difference .

Although this study showed no statistically significant difference between FNAC and FNNAC with respect to average scores and diagnostic adequacy, it proved a statistically significant difference in the number of superior quality smears for which FNNAC is superior to FNAC. Also, this study demonstrated the fact that background blood was less with FNNAC than FNAC. Thus, in a highly vascularised organ like thyroid, FNNAC is preferred over FNAC.

However, in cystic lesionsof thyroid like colloid goitre , colloid nodule, and cystic degeneration in a nodular colloid goitre, FNAC is the procedure of choice. It allows adequate drainage of fluid material and it is also therapeutic in cases of simple benign cysts. FNAC yielded adequate diagnostic material in those cases.

The results obtained in this study of comparison of two techniques of FNC in thyroid swelling is in concordance with the results of various studies conducted in the past.

The observations and the range of scores correlated well with the following studies : Mair et al in 1989 , CV Raghuveer I Leeka et al in 2002 , S Alirizvee M Hussain et al in 2005 , and Mitchell et al in 2007.

TABLE - 14

COMPARISON OF THE NUMBER OF SUPERIOR QUALITY SMEARS OBTAINED BY FNNAC & FNAC WITH OTHER STUDIES:

AUTHOR/ YEAR	**FNNAC**	**FNAC**	**P value**
Ali Rizvee et al in 2005	44.7%	45%	P < 0.05
Present study	**72%**	**44%**	**P <0.05 (statistically significant)**

TABLE - 15

COMPARISON OF THE DIAGNOSTIC ADEQUACY(%) OF FNNAC & FNAC IN THYROID LESIONS WITH OTHER STUDIES :

Diagnostic adequacy	**FNNAC**	**FNAC**	**P value**
CV Raghuveer et al in 2002	82.4%	77.9%	p >0.05
Mitchell et al in 2007	87%	89%	p>0.05
Present study	**96%**	**96%**	**p>0.05 (statistically insignificant)**

On comparing FNNAC with USG guided FNAC , this study showed that the number of superior quality smears were more from FNNAC technique (18 Vs 12) and this difference was found to be statistically significant (P<0.05).

TABLE - 16

S.no	Technique	Average score	Diagnostic adequacy	No. of superior quality smears
1	FNNAC	6.3	96%	18(72%)
2	USG -FNAC	5.9	100%	12(48%)
3	P value	P>0.05	P>0.05	P<0.05

The number of unsuitable smears were none with USG guided FNAC favouring its use in cystic lesions of thyroid . On analysing the mean score under sub categories like cellular adequacy, retention of architecture, degree of cellular trauma and background blood, scores obtained by FNNAC were numerically higher than FNAC. Particularly the amount of background blood was found to be very less in FNNAC technique thus contributing to a higher average score. On analysing the average scores , the average score obtained by FNNAC was more than USG- FNAC (6.3 Vs 5.9). The diagnostic adequacy was found to be better with USG- FNAC(100% Vs 96%) but with no statistical difference .

Although this study showed no statistically significant difference between USG-FNAC and FNNAC with respect to average scores and diagnostic adequacy, it proved a statistically significant difference in the number of superior quality smears for which FNNAC is superior to FNAC. Also, this study demonstrated the fact that background blood was less with FNNAC than USG-FNAC,thus favouring FNNAC over USG-FNAC. However it is to be remembered that in cystic thyroid lesions, USG-FNAC is preferred .

CONCLUSION

- For highly vascular organs like thyroid , FNNAC is the preferred technique as there is better material with less admixture of blood. The number of superior quality smears without admixture of blood is more from FNNAC. FNAC smears although equally diagnostic, mostly produced diagnostically adequate rather than superior quality smears.
- For the cystic lesions of thyroid , FNAC is the procedure of choice as it allows adequate drainage of fluid material and is also therapeutic in some cases, thus yielding more diagnostic material. And the use of ultrasound enhances the diagnostic adequacy of FNAC by reducing the number of unsuitable smears obtained in smaller and cystic lesions. However, the number of superior quality smears is significantly higher with FNNAC than USG-FNAC.
- Hence, the decision to use either FNNAC or FNAC may be decided on the basis of site, size and nature of lesion (solid or cystic).
- In conclusion, each technique has its own merits and demerits. Both the techniques can be combined to obtain a high quality material and to lower the failure rates and ultrasound can be utilised whenever possible.

BIBLIOGRAPHY

1. Zajdela A, Zillhardt P, Voillemot N: Cytological diagnosis by fine needle sampling without aspiration. Cancer; 1987; 59(6): 1201-5.
2. Santos JEC, Leiman G. Non aspiration fine needle cytology: Application of a new technique to nodular thyroid diseases. Acta Cytol;1988:32:353-56.
3. Meherbano MK, Arjune DG, Kulkarni HR. Comparative study of fine needle aspiration and fine needle capillary sampling of thyroid lesions. Acta Cytol;2002. 46:30-34.
4. Raghhuveer CV, Leekha I, Pai MR, Adhikari P: Fine needle aspiration cytology versus fine needle sampling without aspiration. A prospective study of 200 cases. Indian J Med Sci; 2002; 56: 431-9
5. Martin H E and Ellis E : Biopsy Needle puncture and aspiration . Ann Surg. 92:169- 181, 1930
6. Lowhagen T, Willems JS, Lundell G, Sundblad R, Granberg P. Aspiration Biopsy Cytology in Diagnosis of Thyroid Cancer. World J Surg 1981;5:61-73.
7. Briffod M, Gentile A, Hebert H. Cytopuncture in the follow-up of breast carcinoma. ActaCytol 1982;26:195-200.
8. Thomson: Thin needle aspiration Biopsy. ActaCytol 26:262-263, 1982
9. Mair S, Dumbar F, Becker P, Plessis WD. Fine Needle Cytology - Is Aspiration Suction Necessary? A study of 100 masses in various sites. ActaCytol 1989;33:809- 813
10. Rajasekhar A, Sundaram C, Chowdhary T, Charanpal M, Ratnakar KS. Diagnostic utility of Fine Needle Sampling without

aspiration: a prospective study. Diagnostic Cytopathology 1991;7:473-476.

11. Dey P, Ray R. comparison of fine needle sampling by capillary action and fine needle aspiration. Cytopathology 1993;4:299-303
12. Kumarasinghe MP, Sheriffedeen AH. Fine Needle Sampling without aspiration. Pathology 1995;27:330-332
13. Braun H Walch C Beham A. FNAC in head and neck region swellings. LaryngootologIe, 1997, Jan 76(6); 358-63
14. Ghosh A, Misra RK, Sharma SP, Singh HN, Chaturvedi AK. Aspiration Vs Nonaspiration Technique of Cytodiagnosis - a critical evaluation in 160 cases. Indian J, PatholMicrobiol 2000;43:107-112
15. Kamal MM, Arjune DG, Kulkarni HR: Comparative study of fine needle aspiration and fine needle capillary sampling of thyroid lesions. ActaCytol 2002;46:30–34
16. Haddadi-Nezhad S, Larijani B, Tavangar SM, Nouraei SM. Comparison of fineneedle-nonaspiration with fine-needle-aspiration technique in the cytologic studies of thyroid nodules. EndocrPathol. 2003;14:369–73.
17. Ceresini G, Corcione L, Morganti S, Milli B, Bertone L, Prampolini R, Petrazzoli S, Saccani M, Ceda GP, Valenti G:Ultrasound-guided fine-needle capillary biopsy of thyroid nodules, coupled with on-site cytologic review, improves results. Thyroid 2004;14:385–389
18. Yasub E Al – Khattab , Fine needle capillary technique , Is aspiration suction necessary ? Iraqi J Med Sci, 2004; Volume 3 (2) 128 – 31.

19. S.A. Ali Rizvi M. Husain et al : A comparative study of fine needle aspiration cytology versus non-aspiration technique in Thyroid lesion : The surgeon august 2005 Vol 3 no4
20. David D Pother , AA Narula : Should we apply suction during from needle cytology of Thyroid lesion? A systematic review and meta Analysis . Ann R .CollEngl 2006 November 18(7)
21. Mitchell E Zubulin, Joseph A martin , USG Guided fine needle aspiration versus fine needle capillary sampling biopsy of thyroid nodules.: J Ultrasound Med 2007; 26 1697 – 1701
22. Federica Romiteli and EnricaDistario et al, A comparative study of USG guided FNAC and FNNAC in thyroid nodules. Endocrine Pathology , April 2009
23. Dudgeon Ls Patrick Cr : A new method for the rapid microscopical diagnosis of tumour ,Br J Surg 15: 250-261,1927
24. Frable WJ : Needle Aspiration Biopsy: Past, Present and Future, Human Pathol 20. 504-517 , 1989
25. Frable WJ : Needle Aspiration Biopsy: Saunders , Philadelphia , 1983
26. OrellSr, Slerrett GF, Walters MNH , Whilaker D : Manual and Atlas of fine needle aspiration cytology, 2nd Edition, Churchill Livingston
27. Roussel F, Dalion J, Benozio H : The risk of tumoral seeding in needle biopsies , ActaCytol 33; 936-939, 1989
28. Layfield LJ, Fine needle aspiration cytology of cystic parathyroid lesions, Actacytol 35 : 445-447 – 1991.
29. MC Henry , walfish PG, Rosen IB ., Non diagnostic fine needle aspiration aspiration biopsy , a dilemma in management of nodular thyroid disease. Ann Surg 59, 415 -419, 1993.

30. Hamburger JI, Hamburger SW: Fine needle biopsy of thyroid nodules avoiding the pitfalls NY state J med 86 : 241-249, 1986.
31. Grey.H Anatomy of human body,philadelphia,Lea&fetriger,1948
32. Rao AS ,Rao KS ,Thomas L; Solitary nodule in the thyroid.indian J Surg 33:44-51,1971
33. Cushieri SA, Steela RJC, Moosa AR : Essential Surgical practice, Arnold 4th edition.
34. Cusick EL, MacIntosh CA, Krukowski ZH, Williams VMM Ewen SWB, Matheson NA: Management of isolated thyroid swellings: a prospective six year study of fine needle apsiration cytology in diagnosis Br. Med. J. 301 : 318 – 321, 1990.
35. Decker A.G.: Lee McGregor's Synopsis of Surgical Anatomy, 12th ed.
36. Cotran RS, Kumar V, Robbins SL : Robbins Pathologic basis of diseases, WB Saunders 7th ed.
37. Ganong WF : Review of medical physiology : lange, 19th ed
38. Agrawal S: Diagnostic accuracy and role of fine needle non – aspiration cytology in the management of thyroid nodules. J. Surg Oncology 58 : 168 – 172, 1995.
39. Alka B, Rajwanshi A, Dash RS, Mittal B, Saxena AK – Lymphocytic thyroiditis – is cytological grading significant? A correlation of grades with clinical, biochemical, ultrasonography and radionuclide parameters.

40. Nari M, Kapila K, Karak AK,. Verma K: Papillary carcinoma of the thyroid and its variants, a cytohistological correlation Diagncytopathol 2001, Mar 24(3) 167 – 13.

41. Nggada HA, Musa AB, Gali BM, Khalil MA: Fine needle Aspiration cytology of thyroid nodule A Nigerian Tertiary Hospital Experience. The Internet Journal of Cardiovascular Research. 2006 Vol. 5 No.1

42. Orell SR, Sterrett GF, Walters MN, Whitaker D : The thyroid gland. In manual and Altas of Fine Needle Aspiration Cytology, 3rd edition, New York ; Churchill Livingstone , 1992 p 110-140.

43. Thompson LDR: Endocrine Pathology – A volume in the series of Foundation in Diagnostic pathology 2nd edition, Elsevier.

44. Tuttle RM, Lemor H, Burch HB: Clinical features associated with an increased risk of thyroid malignancy in patients with follicular neoplasia by fine needle aspiration. Thyroid 8. 377 – 383, 1998.

45. Wadeleux PA; Winand RJ: thyroid growth modulators evidenced in the sera of patients with simple non toxic goitre.

46. Randolph G.W: Surgery of the thyroid and parathyroid – W.B. Saunders.

47. Remelli F et al: Pathogenesis of thyroid nodules in multinodular goitre. Am J. Pathol. 190 : 215, 1982

48. Kini SR : Needle aspiration biopsy of the thyroid Revisted editorial Diagn. cytopathol 9: 249 – 251, 1993.

49. Matos LG, Koejan Q, Kurtz A, Contribution of fine needle aspiration cytology to diagnosis and management of thyroid disease J. Clin. Pathol 1992: 45, 391 – 395.

50. Mccalister BM, Carson J, Pyper PC : Accuracy of fine needle aspiration cytology in Diagnosis of thyroid swellings. The Internet Journal of Endocrinology 2006 Vol 2 No2.

51. Gharib H. www. thyroid manager. org

52. Gharib H: Fine needle aspiration biopsy of thyroid nodules: advantages, limitation and effect Mayo Clinic Proc 69 : 44-49,1994.

53. Haddadi S.R. Nehad, Jari BL, Tavanagar SM: Fine needle non aspiration cytology Endocrine Pathol 14:4 : 2003 , 369 – 374

54. Holleman F, Hoekstra JB, Ruitenberg HM, Evaluation of fine needle aspiration cytology in the diagnosis of thyroid nodules Cytopathology 1995 6: 175-186.

ANNEXURES

INSTITUTIONAL ETHICAL COMMITTEE,

STANLEY MEDICAL COLLEGE, CHENNAI 1

Title of the Work : A comparative study of fine needle aspirations versus Fine needle non aspiration versus USG guided Fine needle aspiration cytology in the cytological evaluation of thyroid lesion.

Principal Investigator : Dr. Sakthibalan. M

Designation : PG MS (General Surgery)

Department : Department Of General Surgery

Government Stanley Medical College,Chennai-01.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 13.01.2015 at the Council Hall, Stanley Medical College, Chennai-1 at2PMThe members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes

2. You should not deviate from the area of the Work for which you appiied for ethical clearance

3. You should inform the IEC in case of any adverse events or serious adverse reaction

4. You should abide to the rules and regulation of the institution(s).

5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.

6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,

IEC,SMC,CHENNAI

PROFORMA

SL. NO:

- **NAME :** **AGE /SEX:** **IP NO:**
- **ADDRESS WITH CONTACT NUMBER:**
- **DATE OF ADMISSION:**
- **DATE OF DISCHARGE/ DEATH:**

HISTORY OF PRESENTING ILLNESS:

H/O swelling in the neck _ Onset

_Duration

_Rate of growth

_Pain

H/o dyspnoea/ dysphagia/ hoarseness of voice/ syncope

H/o loss of weight/ heat intolerance/ excessive sweating/ diarrhoea

H/o increase in weight/ cold intolerance/ constipation

H/o bone pain/ hemoptysis/ jaundice

PAST HISTORY:

Whether a known case of DM/ hypertension/ asthma/ TB/ epilepsy/ cardiac illness

H/o previous surgeries, if any:

H/o radiation exposure in childhood if any:

H/o drug intake,if any:

PERSONAL HISTORY:

Age of menarche

Marital status

Consanguinity

No.of. Children

Menstrual cycle: regular / irregular

Age of menopause:

FAMILY HISTORY:

H/o similar complaints in the family members,if any

ENVIRONMENTAL HISTORY

H/o similar illness in the neighbourhood.

CLINICAL EXAMINATION:

General examination:

Local Examination: Thyroid swelling

Neck

Oral cavity

Systemic examination:

CVS

RS

CNS

Abdomen

CLINICAL DIAGNOSIS:

INVESTIGATIONS:

CBC:

RFT:

SERUM CALCIUM:

HIV:

HBsAg:

Anti-HCV:

Blood Grouping & Typing:

BT/CT:

Chest X-Ray:

ECG:

THYROID PROFILE:

FNAC/FNNAC/USG-FNAC:

USG NECK:

PRE OP VOCAL CORD ASSESSMENT:

FINAL DIAGNOSIS:

Patient Information Module

You are being invited to be a subject in this study.

Before you participate in this study, I am giving you the following details about this trial, which includes the aims, methodology, intervention, possible side effects, if any and outcomes:

All patients having thyroid swelling will be included in this study. A detailed clinical history will be taken following a standardized proforma. A detailed clinical examination will be made and relevant basic investigations will be done at the time of admission.25 patients are subjected to FNAC , 25 with FNNAC &25 with USG guided FNAC. The results arising from this study will be analyzed and used for academic purposes. You will be given clear instructions at every step and you are free to ask/ clarify any doubts. Your identity will remain confidential. You are free to withdraw from this trial at any point of time, without any prior notice &/ or without any medical or legal implications.I request you to volunteer for this study.

Thanking You,

Investigator's Sign Patient's Sign

(Dr.M. SAKTHI BALAN) (Name:)

Informed Consent

Name: Age/ Sex: IP:

I herewith declare that I have been explained in a language fully understood by me regarding the purpose of this study, methodology, proposed intervention, plausible side effects, if any and sequelae.

I have been given an opportunity to discuss my doubts and I have received the appropriate explanation.

I understand that my participation in this study is completely voluntary and that I am free to withdraw from this study at anytime without any prior notice &/ or without having my medical or legal rights affected.

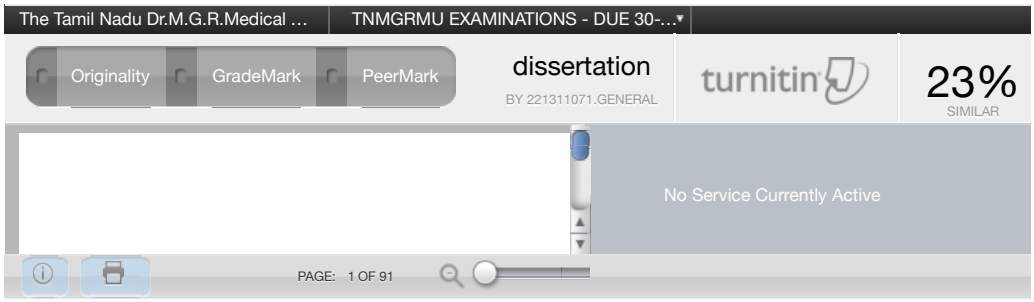
I permit the author and the research team full access to all my records at any point, even if I have withdrawn from the study. However my identity will not be revealed to any third party or publication.

I herewith permit the author and the research team to use the results and conclusions arising from this study for any academic purpose, including but not limited to dissertation/ thesis or publication or presentation in any level.

Therefore, in my full conscience, I give consent to be included in the study and to undergo any investigation or any intervention therein.

Patient's Sign Investigator's Sign

Dr.M.SAKTHI BALAN)


The Tamil Nadu Dr.M.G.R.Medical ...
TNMGRMU EXAMINATIONS - DUE 30-...
Originality
GradeMark
PeerMark
dissertation
BY 221311071.GENERAL
turnitin
23%
SIMILAR
No Service Currently Active
PAGE: 1 OF 91

அரசு ஸ்டான்லி மருத்துவக் கல்லூரி, சென்னை - 600 001.

<u>பங்கு பெறுபவரின் ஒப்பம்</u>

ஆராய்ச்சியின் தலைப்பு : தைராய் சுரபியில் ஊசி மூலம் உறிதல் மற்றும் உறியாமல் மற்றும் ஸ்கேன் முலம் எடுத்தல் ஒப்புமை ஆய்வு

ஆராய்ச்சி நடைபெறும் இடம் : அரசு ஸ்டான்லி மருத்துவக் கல்லூரி,
சென்னை - 1.

பங்கு பெறுபவரின்
பெயரும் முகவரியும் :

நான், ... இந்த ஆராய்ச்சியின் விவரங்களை எனது சொந்த மொழியில் கூற அறிந்து கொண்டேன்.

இந்த ஆராய்ச்சியின் முழுவிவரங்களையும் நான் அறிந்து கொண்டேன். இந்த ஆராய்ச்சியில் நான் பங்குபெறும் போது எனக்கு ஏற்படும் நன்மை தீமைகளை முழுவதுமாக அறிந்து கொண்டேன்.

இந்த ஆராய்ச்சியின் போது எப்போது வேண்டுமானாலும் நான் விலகிக்கொள்ளலாம் என்பதயும், அதனால் எனக்கு கிடைக்கும் மருத்துவத்தில் எந்தவித மாற்றமோ பாதிப்போ இருக்காது என்றும் அறிவேன். இந்த ஆராய்ச்சியில் நான் பங்குபெறுவதற்காக நான் எந்தவித சன்மானமும் (பணமாகவோ, பொருளாகவோ) வாங்கமாட்டேன். இந்த ஆராய்ச்சியின் முடிவுகளை, என் அடையாளங்களை குறிப்பிடாமல் மருத்துவ இதழ்களில் வெளியிட எனக்கு எந்த ஆட்சேபனையும் இல்லை. இந்த ஆரய்ச்சியில் என் பங்கு என்ன என்பதை அறிவேன். இந்த ஆராய்ச்சிக்கு எனது முழுஒத்துழைப்பையும் தருவேன் என்று உறுதி அளிக்கிறேன்.

பங்கு பெறுபவரின் பெயரும் முகவரியும்:

பங்கு பெறுபவரின் கையொப்பம் / விரல்ரேகை :

தேதி:

சாட்சி:

(சாட்சியின் பெயர், முகவரி, கையொப்பத்துடன்)

ஆராய்ச்சி செய்பவரின் பெயரும் கையொப்பமும் :

1	GURU BADHUR	62	M	EUTHYROID	MNG	5055/15	S-FNAC	5 SIMPLE COLLOIDAL GOITRE
2	BAKKIYAM	40	F	HYPOTHYROID	MNG	3135/15	S-FNAC	5 COLLOIDAL GOITRE
3	THANGA MANI	55	F	EUTHYROID	LT SNT	1951/15	S-FNAC	6 COLLOID NODULE WITH CYSTIC DEGENERATION
4	RUBINI	19	F	HYPOTHYROID	DIFFUSE GOITRE	1704/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
5	GAYATHIRI	15	F	HYPOTHYROID	DIFFUSE GOITRE	3467/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
6	NAZEEMA	35	F	EUTHYROID	DIFFUSE GOITRE	3463/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
7	VIJAYA	40	F	EUTHYROID	RT SNT	3462/15	S-FNAC	3 COLLOIDAL GOITRE WITH CYSTIC CHANGE
8	SELVI	45	F	EUTHYROID	MNG	3433/15	S-FNAC	8 HASHIMOTOS THYROIDITIS
9	VANITHA	30	F	EUTHYROID	RT SNT	3449/15	S-FNAC	5 COLLOIDAL GOITRE
10	SUMATHY	41	F	EUTHYROID	MNG	3427/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
11	RAJESWARI	42	F	EUTHYROID	RT SNT	3422/15	S-FNAC	5 COLLOIDAL GOITRE WITH CYSTIC CHANGE
12	SARASWATHY	60	F	EUTHYROID	RT SNT	3411/15	S-FNAC	5 COLLOID GOITRE
13	MEGALA	49	F	HYPOTHYROID	RT SNT	3390/15	S-FNAC	6 FOLLICULAR NEOPLASM OF UNDETERMINED SIGNIFICANCE
14	SHANTHI	32	F	HYPOTHYROID	MNG	3363/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
15	ESWARI	30	F	HYPOTHYROID	MNG	3364/15	S-FNAC	5 COLLOID GOITRE WITH CYSTIC CHANGES
16	LATHA KRISHNAN	40	F	HYPOTHYROID	DIFFUSE GOITRE	3360/15	S-FNAC	8 HASHIMOTOS THYROIDITIS
17	LATHA	35	F	EUTHYROID	DIFFUSE GOITRE	3359/15	S-FNAC	5 COLLOID GOITRE WITH CYSTIC DEGENERATION
18	VELUMANI	30	M	HYPOTHYROID	DIFFUSE GOITRE	3357/15	S-FNAC	5 NODULAR COLLOID GOITRE WITH CYSTIC CHANGES
19	MALA KONDAN	63	M	EUTHYROID	DIFFUSE GOITRE	3354/15	S-FNAC	7 NODULAR COLLOID GOITRE
20	VIJI	25	F	HYPOTHYROID	DIFFUSE GOITRE	3508/15	S-FNAC	5 HASHIMOTOS THYROIDITIS
21	KANAGAVALLI	75	F	EUTHYROID	MNG	3521/15	S-FNAC	7 NODULAR COLLOID GOITRE WITH CYSTIC CHANGES
22	VICTORIA	64	F	EUTHYROID	MNG	3537/15	S-FNAC	8 NODULAR COLLOID GOITRE WITH CYSTIC CHANGES
23	PARVATHI	19	F	EUTHYROID	DIFFUSE GOITRE	3428/15	S-FNAC	7 HASHIMOTOS THYROIDITIS
24	GEETHA	62	F	EUTHYROID	RT SNT	3399/15	S-FNAC	5 COLLOID GOITRE WITH CYSTIC DEGENERATION

26	MAHALAKSHMI	31	F	HYPOTHYROID	RT SNT	3393/15	USG-FNAC	7 COLLOID GOITRE WITH CYSTIC CHANGES
27	REGINI	31	F	EUTHYROID	RT SNT	3386/15	USG-FNAC	5 COLLOID GOITRE
28	VENKATESAN	38	M	EUTHYROID	MNG	3380/15	USG-FNAC	7 MEDULLARY CARCINOMA THYROID
29	PONNAMMAL	65	F	EUTHYROID	MNG	3376/15	USG-FNAC	5 COLLOID GOITRE
30	BAKYALAKSHMI	15	F	EUTHYROID	DIFFUSE GOITRE	3353/15	USG-FNAC	5 HASHIMOTOS THYROIDITIS
31	CHANDRA KANTHA	32	F	HYPOTHYROID	DIFFUSE GOITRE	3349/15	USG-FNAC	7 HASHIMOTOS THYROIDITIS
32	SANGEETHA	28	F	EUTHYROID	DIFFUSE GOITRE	3345/15	USG-FNAC	7 NODULAR COLLOID GOITRE WITH CYSTIC DEGENERATION
33	DIVYA	17	F	HYPOTHYROID	DIFFUSE GOITRE	3346/15	USG-FNAC	8 COLLOID GOITRE WITH CYSTIC DEGENERATION
34	KRISHNA VENI	48	F	EUTHYROID	DIFFUSE GOITRE	3344/15	USG-FNAC	8 HASHIMOTOS THYROIDITIS
35	TAMIL ARASI	34	F	EUTHYROID	MNG	3336/15	USG-FNAC	5 COLLOID GOITRE WITH CYSTIC DEGENERATION
36	SEMBARATHI	23	F	EUTHYROID	RT SNT	3324/15	USG-FNAC	5 COLLOID GOITRE WITH CYSTIC DEGENERATION
37	KALPANA	28	F	EUTHYROID	LT SNT	3321/15	USG-FNAC	5 COLLOID GOITRE
38	RUCILLA	31	F	EUTHYROID	DIFFUSE GOITRE	3318/15	USG-FNAC	8 HASHIMOTOS THYROIDITIS
39	THOMNARAMMAL	66	F	EUTHYROID	DIFFUSE GOITRE	3309/15	USG-FNAC	4 COLLOID GOITRE
40	VALLIAMMAL	63	F	EUTHYROID	DIFFUSE GOITRE	3258/15	USG-FNAC	5 COLLOID GOITRE WITH CYSTIC DEGENERATION
41	BHAVANI	28	F	EUTHYROID	RT SNT	3254/15	USG-FNAC	5 COLLOID GOITRE
42	SAKUNTHALA	37	F	HYPOTHYROID	MNG	3241/15	USG-FNAC	5 NODULAR COLLOID GOITRE
43	VIJAYA	39	F	EUTHYROID	LT SNT	3239/15	USG-FNAC	5 COLLOID GOITRE
44	VARALAKSHMI	30	F	EUTHYROID	LT SNT	3237/15	USG-FNAC	5 NODULAR COLLOID GOITRE WITH CYSTIC DEGENERATION
45	RAJESWARI	30	F	EUTHYROID	LT SNT	3236/15	USG-FNAC	5 COLLOID GOITRE
46	INDRA	25	F	EUTHYROID	MNG	3231/15	USG-FNAC	5 NODULAR COLLOID GOITRE WITH CYSTIC DEGENERATION
47	REVATHY	23	F	EUTHYROID	DIFFUSE GOITRE	3227/15	USG-FNAC	7 COLLOID GOITRE
48	SABITHA	40	F	HYPOTHYROID	DIFFUSE GOITRE	3214/15	USG-FNAC	8 HASHIMOTOS THYROIDITIS
49	RISHWANA PARVEEE	22	F	EUTHYROID	MNG	3190/15	USG-FNAC	7 HASHIMOTOS THYROIDITIS
50	ELAVARASI	22	F	EUTHYROID	MNG	3186/15	USG-FNAC	7 HASHIMOTOS THYROIDITIS

51	MUNIYAMMAL	55	F	EUTHYROID	RT SNT	3181/15	FNNAC	8 ADENOMATOID GOITRE
52	PRISILLA	18	F	HYPOTHYROID	DIFFUSE GOITRE	3177/15	FNNAC	8 HASHIMOTOS THYROIDITIS
53	PAVAMANI	29	F	EUTHYROID	MNG	3123/15	FNNAC	5 LYMPHOCYTIC THYROIDITIS
54	CHINNAMMAL	67	F	EUTHYROID	MNG	3120/15	FNNAC	8 ADENOMATOID GOITRE
55	GANDHI MATHI	28	F	EUTHYROID	MNG	3118/15	FNNAC	5 COLLOID GOITRE
56	YASMIN	16	F	EUTHYROID	DIFFUSE GOITRE	3111/15	FNNAC	5 HASHIMOTOS THYROIDITIS
57	SHENBAGA DEVI	30	F	EUTHYROID	RT SNT	3110/15	FNNAC	5 NODULAR COLLOID GOITRE WITH CYSTIC DEGENERATION
58	MAGESWARI	30	F	EUTHYROID	RT SNT	3562/15	FNNAC	3 COLLOID GOITRE
59	PUNITHA	30	F	EUTHYROID	DIFFUSE GOITRE	3561/15	FNNAC	7 COLLOID GOITRE
60	LAVANYA	38	F	EUTHYROID	MNG	3574/15	FNNAC	5 ADENOMATOID GOITRE,HURTHLE CELL CHANGES
61	SAMSUNISHA	57	F	EUTHYROID	DIFFUSE GOITRE	3586/15	FNNAC	7 NODULAR GOITRE WITH CYSTIC DEGENERATION
62	DEEPIKA	15	F	HYPOTHYROID	DIFFUSE GOITRE	3603/15	FNNAC	7 COLLOID GOITRE
63	ROJA	37	F	EUTHYROID	RT SNT	3602/15	FNNAC	8 COLLOID GOITRE WITH CYSTIC DEGENERATION
64	SUDHA	29	F	EUTHYROID	RT SNT	3605/15	FNNAC	7 ADENOMATOID GOITRE
65	LATHA	40	F	EUTHYROID	MNG	3607/15	FNNAC	7 HASHIMOTOS THYROIDITIS
66	SUMATHY	21	F	HYPOTHYROID	DIFFUSE GOITRE	3608/15	FNNAC	8 HASHIMOTOS THYROIDITIS
67	ARTHI	28	F	EUTHYROID	DIFFUSE GOITRE	3627/15	FNNAC	8 HASHIMOTOS THYROIDITIS
68	VENGAMMAL	50	F	EUTHYROID	MNG	3628/15	FNNAC	8 HASHIMOTOS THYROIDITIS
69	INDHAROJ	38	F	EUTHYROID	MNG	3660/15	FNNAC	7 COLLOID GOITRE
70	ROHAVATHY	29	F	EUTHYROID	DIFFUSE GOITRE	3671/15	FNNAC	8 HASHIMOTOS THYROIDITIS
71	REBEKA	48	F	EUTHYROID	RT SNT	3686/15	FNNAC	7 COLLOID GOITRE WITH CYSTIC DEGENERATION
72	THANGARAJ	60	M	EUTHYROID	RT SNT	3584/15	FNNAC	5 FOLLICULAR VARIANT OF PAP CA
73	LLELA	15	F	HYPOTHYROID	DIFFUSE GOITRE	3585/15	FNNAC	7 HASHIMOTOS THYROIDITIS
74	UMA	33	F	EUTHYROID	DIFFUSE GOITRE	3694/15	FNNAC	7 NODULAR COLLOID GOITRE WITH CYSTIC DEGENERATION
75	KAAMINI	24	F	EUTHYROID	DIFFUSE GOITRE	3707/15	FNNAC	7 HASHIMOTOS THYROIDITIS

ABSTRACT

A COMPARATIVE STUDY OF *FINE NEEDLE ASPIRATION CYTOLOGY VERSUS FINE NEEDLE NON ASPIRATION CYTOLOGY VERSUS ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY* IN THE CYTOLOGICAL EVALUATION OF THYROID LESIONS

AIMS & OBJECTIVES:

To evaluate the efficacy of fine-needle non-aspiration cytology (FNNAC) with that of standard fine-needle aspiration cytology (FNAC) and USG guided FNAC of thyroid lesions as regards to cellular and hemorrhagic yield.

MATERIALS AND METHODS:

This study included 75 patients with thyroid lesions, out of which 25 cases underwent standard FNAC, 25 cases underwent FNNAC and 25 cases underwent USG guided FNAC. All the needle sampling procedures were performed by a single surgeon. The samples were then assessed cytologically using five parameters .i.e., background blood or clot,amount of cellular material,degree of cellular degeneration,degree of cellular trauma and retention of architecture and further categorised as unsuitable,adequate and diagnostically superior for cytological evaluation.

RESULTS:

Analysis showed that more number of diagnostically superior samples were obtained from FNNAC technique(72%) than that of standard FNAC(44%), whereas FNAC yielded more number of diagnostically adequate samples(52%) than that of FNNAC(24%), diagnostically inadequate samples were equal with both standard FNAC & FNNAC(4%). However, the diagnostic adequacy was equal in both FNNAC and standard FNAC techniques in thyroid lesions. On comparing FNNAC with that of USG guided FNAC, it was found that superior quality smears were more in FNNAC technique(72%vs 48%), but diagnostically adequate samples are more in USG guided FNAC than FNNAC(52% vs 24%). Also USG guided FNAC yielded fewer unsuitable smears.

CONCLUSION:

For highly vascular organs like thyroid , FNNAC is the preferred technique as there is better material with less admixture of blood by yielding more number of superior quality smears. The use of ultrasound enhances the diagnostic adequacy of FNAC by reducing

the number of unsuitable smears obtained in smaller and cystic lesions.